Universidad Carlos III de Madrid

TESIS DOCTORAL

Mutual Fund Structure and Performance

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“Bien están los buenos pensamientos, pero resultan tan livianos como burbuja de jabón, si no los sigue el esfuerzo para concretarlos en acción.”

Gaspar Melchor de Jovellanos

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Abstract

Sub-advising contracts have grown considerably during recent decades despite the agency issues identified by prior literature. In the first chapter, I find that the market provides several contractual arrangements such as co-branding, multi-advisory arrangements and performance fees that management companies can use to protect their more informed investors from poor management by these sub-advising firms. Additionally, I show that fund families that have outsourced some of their portfolios tend to have greater market share, especially when a new investment style is launched. The second chapter empirically analyzes the role of investment companies' core competencies in explaining the growing importance of outsourcing within the mutual fund industry. We demonstrate that management companies allocate portfolios that are not within their core competencies to sub-advisors whose core competency coincides with the outsourced mutual fund. We investigate the efficiency of such decisions in terms of performance, and the findings suggest that selecting a sub-advisor according to core competency improves mutual fund performance. In the third chapter, I examine whether individual management leads to better performance than team approach when managers face greater coordination cost. SRI funds provide an ideal empirical setting for testing this, as these funds implement strict social criteria. We show that SRI funds are better managed under an individual management structure independently of the specific fund and family characteristics. This performance increases for SRI funds with highly levels of social screenings since individual management leads to sharpen information processing and decision-making.

Resumen

Los acuerdos de sub-contratación para la gestión de fondos de inversión han crecido considerablemente durante las últimas décadas, a pesar de los problemas de agencia que sufren dichos contratos. En el primer capítulo, se muestra que el mercado ofrece varios acuerdos contractuales, tales como "co-branding", "multi-gestión" y "compensación por desempeño" que las gestoras pueden utilizar para proteger a sus inversores más sofisticados de la posible mala gestión de las empresas sub-contratadas. También se observa que las gestoras que han sub-contratado externamente algunas de sus carteras suelen tener una mayor cuota de mercado, sobre todo cuando lanzan un nuevo estilo de inversión. El segundo capítulo se analiza la relación entre la especialización de las gestoras y las decisiones de sub-contratación. Se muestra que las gestoras de fondos tienden a sub-contratar carteras que no están dentro de sus competencias básicas y buscan empresas externas que si tengan dicha especialidad. Se investiga la eficacia de este tipo de decisiones en términos de rendimiento y los resultados sugieren que la selección de un gestora externa especialista en la categoría del fondo sub-contratado mejora el rendimiento de dicho fondo. En el tercer capítulo, se estudia cuando la gestión de carteras por un solo gestor es mejor que la gestión formada por un equipo de gestores. Se define el coste de coordinación entre individuos como el principal problema de la gestión en equipo. Los fondos de inversión socialmente responsables proporcionan un marco empírico ideal para este estudio, ya que estas carteras implementan estrictos criterios sociales que reducen el conjunto de oportunidades de inversión. Los resultados indican que fondos de inversión con responsabilidad social son mejor gestionados con una estructura de gestión individual. Este mejor rendimiento aumenta cuanto más restringido son las oportunidades de inversión que dicho fondo permite.

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Chapter 1: Introduction

US registered investment companies play a major role in the US economy and around the world financial markets. According to the Investment Company Institute (ICI Fact Book, 2014), there are 30 trillions of dollars in mutual funds asset worldwide, with half of them ($15 trillions) in the US mutual fund market. Besides, the number of sub-advised funds has grown considerably and at a significantly higher rate than mutual funds managed in-house. According to the ICI, approximately 40% of funds were delegated to a sub-advisor for portfolio management in 2009. The number of mutual funds with either affiliated or unaffiliated sub-advisors grew from 1,304 in 1999 to 2,414 in April 2009, which represents an increase of 85%. Moreover, the value of outsourced funds is expected to increase by up to 2.2 trillion dollars by 2016 (Financial Research Corporation).

In an industry that is becoming more and more competitive, with a growing universe of investments and greater complexity of assets, a team management structure seems to be more optimal for handling and proceeding larger volume of information related to the investment management decisions. Consistent with this phenomenon, there has been an outstanding growth of team management in the mutual fund industry over the past two decades. For example, by mid 90s, the proportion of team managed funds was barely 30% while today this figure went up to nearly 70%. Despite the notable switch toward team-based portfolio management, the extant academic literature has not found clear performance benefits of teamwork in the fund industry.

These figures suggest the emergence of new business models within the mutual fund industry that must be studied and properly understood. Recent literature on mutual funds has focused on the decisions made by firms that provide mutual funds and their consequences for investors, including decisions about fund family structure and strategy (Nanda et al., 2004 and Gaspar et al., 2006), whether to merge or liquidate funds (Khorana et al., 2007), and the role of fund boards and their impact on fund fees (Ding and Wermers, 2009). This thesis aims to explain the growth of sub-advising portfolio

management in the last decade and investigates how different organizational structures perform within the investment funds industry.

Outsourcing asset management may create a set of agency problems ranging from a simple lack of effort on the part of the agent to the unfair treatment of different clients. In many cases, portfolios are managed by companies that also manage their own funds and, in such cases, if the costs and benefits of managing both types of funds are different, some conflicts of interest may arise and the agent (sub-advisor) could give a preferential treatment to one group of funds over the other. The fact that outsourced funds are unable to outperform in-house funds makes it even harder to understand the growth of outsourcing portfolio management, unless fund performance was not the main driver. Providing further explanations of why performance does not appear to concern these firms when initiating a sub-advisory agreement will help to understand what motivates management companies to outsource their portfolio management.

The organizational structure of managmentent companies plays also a critical role on the fund investments efficiency. Team management can gain and profit from larger intrinsic knowledge and this should be accompanied with portfolios under team structures being outperforming those managed by an individual manager, however. most of the current research on fund management structure is unable to evidence it. This results together with the fact that there are about one third of portfolios that are still managed by individual managers, arise the interest of studying what are the advantage of individual portfolio management. We draw on the Steiner's theory of process loss (1972) to claim that coordination costs in reaching an optimal decision under time constraints present in the portfolio management industry is one of the downside of using a team approach.

The primary objective of this thesis is to study what motives management companies to outsource the investment decisions of some of their funds and analyze the role that coordination cost plays in the efficiency of portfolio management structures. The thesis is structured in three chapters. The first chapter examines the growth of sub-advising within the investment funds industry over the last decade and shows that outsourcing contracts allow management companies to gain market share. Contrary to previous literature, I document that outsourced funds underperform only when investors are

uninformed. For cases in which the investor demands good management, the market actually provides several contractual arrangements (co-branding, multi-advisory agreements or performance fees) for monitoring sub-advisors. Therefore, by offering each client what they demand, the fund families can benefit from outsourcing to improve their market share.

The second chapter of this thesis analyzes the role of core competencies in outsourcing decisions. The results are in general consistent with previous research on industrial organization. We show that management companies are more likely to outsource funds outside his core competency while keeping in-house the funds that are within his core business Additionally, firms outsourcing the management of funds that exceeded their core competency improved the performance of the funds managed internally compared to investment companies that maintained in-house management of such funds. Lastly, in this chapter we demonstrate that the core competency remains an important factor in firm outsourcing decisions even when other factors are involved, such as pre-existing commercial relationships. Previous studies (e.g., Poppo and Zenger, 2002) indicate the importance of previous interactions between companies in subsequent agreements or contracts.

The third chapter addresses another interesting questions: what are the advantage of individual portfolio management as well as under which circumstances such organization structures are more suited than team management. We examine whether individual management leads to better performance, relative to team management approach, when portfolio managers face higher coordination costs. We show that SRI funds are better managed under an individual management structure independently of the specific fund and family characteristics. This performance increases for SRI funds with highly levels of social screenings since individual management leads to sharpen information processing and decision-making since high levels of screening criteria funds have a more constrained set of investment opportunity than conventional funds.

This thesis contributes to several strands of the literature. First, it relates to the general literature on principal-agent relationships (e.g., McAfee and McMillan (1986), Holmstrom and Milgrom (1987), Kawasaki and McMillan (1987), Holmstrom and Milgrom (1991)) by applying the principal-agent framework to describe outsourcing in

the specific case of the mutual fund industry. More specifically, we relate to the outsourcing literature (Cashman and Deli (2009), Kuhnen (2009), Duong (2010), Del Guercio et al. (2010, 2014), Chuprinin et al. (2013) and Chen et al. (2013)) while providing empirical evidence of contracting design to mitigate some of the main issues in an outsourcing model. As far as we know, this is the first study in which outsourced mutual funds are not presented as underperforming portfolios. Second, it also contributes to the recent literature on mutual funds at the family level (e.g., Gaspar, et al. (2006) or Elton et al. (2007)), showing how families use outsourcing agreements to strategically attend to the potential types of investor to gain market share. Third, the research is related to industrial organization literature on core competency and firm performance (Quinn, 1992; Ellram and Billington, 2001), and outsourcing activity and internal efficiency (Hamel and Prahalad, 1990; Venkatesan, 1992 and Quinn and Hilmer, 1994). Forth, this thesis contributes to the general and broader organizational management literature when manager of corporations face different restrictions and firms suffer from coordination problems. And finally, we also contribute to the growing literature of social concerned investments, in which prior literature is still unsettled about its effectiveness in general performance terms.

Chapter 2: Management Sub-advising: The Mutual Fund Industry

1. Introduction

Over the last decade, the number of sub-advised funds has grown considerably and at a significantly higher rate than mutual funds managed in-house. According to the Investment Company Institute (ICI), approximately 40% of funds were delegated to a sub-advisor for portfolio management in 2009. The number of mutual funds with either affiliated or unaffiliated sub-advisors grew from 1,304 in 1999 to 2,414 in April 2009, which represents an increase of 85%. Moreover, the value of outsourced funds is expected to increase by up to 2.2 trillion dollars by 2016 (Financial Research Corporation). These figures suggest the emergence of a new business model within the mutual fund industry that must be studied and properly understood.

Despite the growth of outsourced portfolio management in the mutual fund industry, relatively little research has been conducted on the reasons why management companies are sub-advising the portfolio management of their funds. Studies of this new business model for mutual funds have compared the performance of outsourced funds to that of funds managed in-house. In general, these studies (Duong (2010), Chuprinin et al. (2013) and Chen et al. (2013), among others) indicate that externally managed funds significantly underperform internally managed funds, and they provide explanations based on specific actions taken by portfolio managers to benefit in-house mutual funds (e.g., assigning preferential IPOs and the preferential use of information).

This chapter aims to explain the growth of sub-advising within the investment funds industry in the last decade, showing that such agreements help managers to gain market share in an increasingly competitive industry. Because it is difficult to explain how market share is gained by offering only poorly managed sub-advised funds, we should first examine these contracts in more depth to determine if there are some cases that do not underperform. We find that, in fact, underperformance is more likely to exist only when the investor tolerates it (either because they have other interests or because they

are uninformed). For cases in which the investor demands good management, we show that the market actually provides the necessary mechanisms to monitor the sub-advisors. We demonstrate that including some contractual arrangements (such as cobranding, multi-advisory or performance fee arrangements) into the outsourcing contract can mitigate the agency issues of firms managing internal and external portfolios. Therefore, by offering each client what they really demand, the fund families can benefit from outsourcing to improve their market share.

Contrary to previous literature, we show that outsourcing contracts can produce well performing funds under specific types of contractual arrangements that eliminate the underperformance caused by the conflict of interest discussed above. Our findings indicate that an incentive fee mechanism and different types of sub-advisory agreements – such as multi-manager contracts and co-branding business models – serve to control and monitor the conflict of interest.

We first analyze the co-branding model as a contractual arrangement to reduce the negative effects of this conflict. In a co-branding arrangement, the principal advisor partners with a sub-advisor to capitalize on the reputation of the sub-advisor (or a specific portfolio manager employed by the sub-advisor). Previous literature on contract design (Hayek (1948) and Marshall (1949)) indicates that firm reputations and brand names are adequate mechanisms to assure contract performance. In this case, the conflict of interest in the management company is reduced because the sub-advisor could lose not only the sub-advisory contract but also its reputation or prestige (e.g., Klein and Leffler (1981) point out that reputation effects represent an implicit protection against adverse selection). We document an improvement of up to 119 basis points (bps) per year for funds operating under a co-branding model in which sub-advisory services are employed in cases of conflict of interest.

The second mechanism is the multi-advising arrangement, which allows management firms to hire more than one sub-advisor to manage its funds. Such contracts are exempt from certain requirements of mutual funds mandated by the U.S. Securities and Exchange Commission (SEC), which allows them to terminate and appoint new unaffiliated sub-advisors without shareholder approval; this exemption makes it easier and less costly to terminate the sub-advisory relationship**.** Under this framework, sub-

advisors are concerned with losing contracts; thus, they focus more on fund management, which leads to a more competitive environment. Given a potential conflict of interest, we find that multi-advisory outsourcing contracts improve fund performance by 106 bps per year. Some companies recognize the usefulness of such agreements and include them as an exception in contracts with advisory and sub-advisory firms being restricted from managing other funds.[1]

Third, we analyze whether incentive fees might mitigate the underperformance of sub-advised mutual funds. Incentive fees are a reward structure that makes management compensation a function of investment performance. Legally, a mutual fund can only use a type of fee known as a "fulcrum fee" as an incentive fee.[2] We find that sub-advised funds governed by performance fee contracts have significantly improved performance. We also observe that sub-advised funds subject to conflicts of interest enjoy a performance improvement of approximately 127 bps per year when they charge a performance fee to mitigate such conflict.

After revising the role of these contractual arrangements (cobranding, multi-advisory or performance fee arrangements) and overcoming the underperformance concerns, we study how fund families are establishing specific outsourcing agreements in financial markets, justifying the extensive use of outsourcing in the mutual fund industry over the last decade. Recent studies of decisions in mutual fund families indicate that they face incentives to increase the menu of funds offered to customers, increasing both the number of funds and the investment objectives. Massa (2003) notes that fund proliferation is a tool used by fund families to increase market coverage and limit competition given the free-switching options offered to investors (that is, firms allow switching across funds belonging to the same family at no cost). Gallaher et al. (2006)

[1] For instance in our database, we observe that the principal advisor of John Hancock Funds II - International Growth Equity entered into an agreement with Turner Investments, L.P. ("The Sub-advisor") in which Turner agreed that for a five-year period, it will not act as an investment adviser for any fund with investment strategies and policies substantially similar to those of the sub-advisory fund. However, the sub-advisor is allowed to manage other funds in cases of multi-manager funds in which Turner is one of three or more managers of such fund.

[2] According to the 1970 Amendment of the Investment Company Act of 1940, the incentive fee must be centered on an index, with increases in fees for performance above the index matched by decreases in fees for performance below the index.

observes that the more investment strategies a mutual fund family offers, the larger the flows of funds received.

Additionally, Khorana and Servaes (2012) show that price competition and product differentiation are both effective strategies for increasing market share in the mutual fund industry. We hypothesize that management companies could be using outsourcing to increase their market share and therefore their profits, offering a wider range of products especially in those investment styles where they have no previous experience. Outsourcing allows them to focus and produce in-house in their areas of expertise while externalizing those activities with which they have less experience. We find that management engaged with outsourcing contracts are more likely to gain market share, especially if such arrangements allow them to offer funds with new investment objectives.

Given the positive impact of contractual agreements on underperformance concerns, why some outsourcing agreements do not employ these mechanisms remains unresolved. We hypothesize that including such clauses in the outsourcing contract involves writing the contracts under higher fees (the agent may demand higher compensation because he could lose some privileges, for example, the subsidization evidenced by Chuprinin et al. (2013) could not be applied here) and it is even harder to find a counterpart willing to agree with these arrangements. This is also consistent with prior literature on contractual theory that claims that as the number of clauses in a contract goes up, more expensive it becomes to write the arrangement (Balakrishnan and Wernerfelt (1986)).

We argue that incorporating these arrangements may be costly and that greater effort should be dedicated to establishing the agreements. Therefore, the management companies incur these costs only if the potential investors are highly sensitive to performance. We find that outsourced mutual funds oriented toward sophisticated investors incorporate these contractual arrangements to avoid underperformance although the cost and effort to impose them could be higher, but funds oriented toward unsophisticated investors are not sensitive to poor performers and do not need to make that extra effort. Under this framework, outsourcing is an appropriate mechanism through which mutual fund families can increase their market share and therefore their

profits while discriminating between different types of investors according to their sophistication.

2. Background and Hypothesis Development

On the specific literature addressing outsourcing in the mutual fund industry, Cashman and Deli (2009) find that outsourced funds might perform better than internally managed funds when the underlying economics suggest that a fund should be sub-advised. Kuhnen (2009) analyzes how the decision to outsource is influenced by connections between the board of directors and the advisor and finds that sub-advised contracts are more likely when these relationships are strong. Del Guercio et al. (2010, 2014) analyze the different channels (direct and using a broker) for investing in mutual funds and their relationship with performance, finding that underperformance is limited to the broker-sold segment. Chen et al. (2013) show that funds managed externally significantly underperform those run internally and explain this by contractual externalities and firm boundaries that make it difficult to extract performance from an outsourcing relationship. Duong (2010) finds that outsourced funds underperform an in-house managed peer when they are managed by the same company, suggesting managerial conflict of interest, and Chuprinin et al. (2013) suggest that in-house funds benefit from the subsidization of outsourced funds as part of the incentive compensation of the sub-advisory company.

Mutual fund families (the principal) may benefit from using one or more sub-advisors (the agent), thereby capturing talent that is not available in-house. However, these sub-advisors might be managing funds from other families and even managing their own funds. In this latter case, the agent could focus more effort on its internal funds and

provide them with a preferential treatment. This scenario generates a conflict of interest framework is which externally managed funds underperform their internally managed peers. Previous literature has shown that management firms tend to favor their own funds to the detriment of sub-advised funds through preferential treatment in IPO allocations (Chen at al. (2013) or Duong (2010)), unobserved actions such as abnormal cross-trading activity between in-house and external funds or offering preferential information to in-house funds (Chuprinin et al. (2013)).

Despite these findings, it is not clear why the market does not prevent this agency issue or provide efficient mechanisms to monitor the interested actions of external sub-advisors. We analyze in more detail some specific contractual agreements that are employed in the financial markets (such as cobranding, multiple advisors and performance fees) to study if they are being used to mitigate the negative effects of the agency issues that appear when external firms simultaneously manage their own and outsourced funds and to see if they could help us to partially understand the wide use of outsourcing over the last decade.

We discuss co-branding as a sub-advisory arrangement in which the principal advisor partners with a sub-advisor to capitalize on the sub-advisor's reputation (the fund includes the name of the sub-advisor in the fund's name to attract new investors).[3] Conflicts of interest will be mitigated as the sub-advisor will be concerned not only about the fees it receives but also about fund's performance linked to its reputation. The contract design literature has considered "firm reputations" and "brand names" to be a mechanism that provides incentives that assure contract performance (Hayek (1948) and Marshall (1949)). Klein and Leffler (1981) also claim that reputation effects constitute an implicit protection against adverse selection. This private-contract enforcement mechanism relies upon the value to the firm of repeat sales to satisfied customers as a means of preventing underperformance.

We also examine multi-advisory agreements, that is, those arrangements made between the management company and more than one sub-advisor.[4] Hill (1982) reviews the differences in performance of teams and individuals working with limited interaction and shows that group performance is generally superior to the performance of the average individual in both qualitative and quantitative terms. Prior studies on mutual funds have also shown that the strategic choice of management structure is associated with differences in performance depending on whether funds are managed by single

[3] For instance, the Metropolitan Series Fund (Advisor) outsourced one of their funds to BlackRock, LLC (Sub-advisor) under the name of BlackRock Aggressive Growth Portfolio. More recently, Metropolitan Series Fund approved a change of sub-advisor to Frontier Capital Management Company, LLC, and the name of the portfolio also changed to Frontier Mid Cap Growth Portfolio.

[4] For instance, JP Morgan Multi Manager Small Cap Growth Fund is externally co-managed by BlackRock Capital Management, Inc, ClariVest Asset Management LLC, UBS Global Asset Management and Oberweis Asset Management, Inc.

managers or by teams of managers (Bliss et al. (2008), Karagiannidis (2010), Bar et al. (2011), or Patel and Sarkissian (2013)).[5] We expect multi-advisory agreements to be an optimal arrangement that address management conflicts of interest for two reasons. First, the SEC exempts multi-manager funds from having to obtain shareholder approval to terminate sub-advisory contracts.[6] This exemption makes it easier and cheaper to terminate these contracts when there is a poor performance record and to generate greater competition among the sub-advisors that manage the fund. Previous studies as Chevalier and Ellision (1999) or Kempf et al. (2009) demonstrate that the risk of job loss is an important determinant of managerial behavior. In addition, Macaulay (1963) provides some evidence that firms prevent sub-optimal contracts by using effective non-legal sanctions consisting primarily of the loss of future business. This self-enforcement mechanism that assures performance by threatening termination of the relationship has also been examined in Macneil (1974), Goldberg (1976), Williamson (1979) and Klein and Leffler (1981). Second, multi-advising contracts involve compensation that is shared by all sub-advisors that form the contract. According to the literature on contractual theory, profit sharing will generate mutual monitoring and peer pressure that will positively affect firm productivity (Kandel and Lazear (1992), Freeman, Kruse and Blasi (2010)).

Finally, there is an extensive literature analyzing performance-based contracts in the context of agency theory to solve problems of moral hazard or adverse selection (e.g., Holmstrom (1979) or Shavell (1979)), but in the specific case of the mutual fund industry, performance fee compensation has been proposed to eliminate the conflict of interest between the portfolio manager and mutual fund investors.[7] Starks (1987) claims that symmetric contracts dominate "bonus" contracts when motivating the manager to

[5] General results are consistent with the idea that "two heads are better than one" based on empirical studies (Hastie (1986), Kerr, MacCoun, and Kramer (1996) or Laughlin and Ellis (1986), among others). However, it must be highlighted that the multi-advisor structure is not the same as the team of managers previously analyzed by literature. In a multi-advisor case, each sub-advisor manages a fraction of the fund's portfolio but they do not act as a team, having no cooperation or interaction among the managers.

[6] See SEC Release Ns. 33-8312, 34-48683, IC-26230, available at http://www.sec.gov/rules.shtml.

[7] Legally, if a mutual fund decides to charge an incentive fee, it must use a type of fee known as a "fulcrum fee", which constitutes a symmetric contract because the manager compensation is established as a function of investment performance relative to some benchmark. Mutual funds generally have a fixed component of fees plus a variable component that must be symmetrical around a benchmark, and in practice, every mutual fund has an upper limit and a lower limit to the variable component.

achieve better portfolios.[8] Ou-Yang (2003) analyzed the relationship between an investor and a professional portfolio manager in a continuous-time principal-agent framework and finds that optimal contracts are of a symmetric form. Elton et al. (2003) find evidence of superior performance among US mutual funds with explicit incentive fees, compared with similar funds without explicit incentive fees. More recently, Kyle et al. (2011), in a model that endogenizes information acquisition, conclude that linear contracts could induce the manager to apply more effort for information acquisition. We would expect these contracts to solve the moral hazard problem in the case of outsourcing business in mutual funds by aligning the management company's and the sub-advisor's incentives.

> *HYPOTHESIS 1: Several contractual arrangements such as co-branding, multi-advising and performance-based fees improve the performance of sub-advised funds by mitigating the potential conflict of interest in outsourcing contracts.*

After demonstrating that underperformance is not a universal issue in outsourcing agreements and that, in fact, some contractual agreements could be used to avoid it, we next study when these mechanisms are employed in the markets and how they could help us to understand the growing relevance of outsourcing over the last decade. To elucidate this topic, we begin with two strands of mutual fund literature: the literature about fund family decisions regarding fund creation, the variety of styles offered and market share (among others Khorana and Servaes (2012)) and the literature about investor sophistication and fund families' discrimination regarding investors (for example, Sirri and Tufano (1998) or Del Gercio et al. (2010)).

Recent studies show that fund families search to increase their market share and thereby maximize their profits, and price competition and product differentiation are both effective strategies to increase market share in the mutual fund industry. Khorana and Servaes (2012) point out that families that offer a wider range of products and differentiated funds relative to the competition are characterized by higher market shares. Additionally, Massa (2003) notes that fund proliferation is used as a tool by fund families to increase market coverage and limit competition given the free-switching

[8] Some other studies as Stoughton (1993), Admati and Pfleiderer (1997) or more recently Li and Tiwai (2009) pointed out that symmetric compensation may not be the optimal structure in some cases.

options offered to investors (that is, firms allow switching across funds belonging to the same family at no cost). Gallaher et al. (2006) observe that the more investment strategies a mutual fund family offers, the larger the flow of funds received. In addition, from the industrial organization literature, Siggelkow (2003) demonstrates that U.S. mutual funds that belong to focused fund providers outperform similar funds offered by diversified providers. Focusing on a few investment objectives allows management companies to manage funds more effectively and improve fund performance. However, a negative effect arises from this focused strategy. Fund families will reduce cash inflows, thus affecting profitability, because they do not benefit from the demand externalities generated by a broad product offering. Therefore ideally, a fund family should benefit from offering a wide array of funds while focusing on the management of a few investment styles, and this organizational structure could be easily implemented using outsourcing arrangements.

We hypothesize that management companies could be using outsourcing to increase their market share and therefore their profits, offering a wider range of products especially in investment styles where they lack experience. Outsourcing allows them to focus and produce in-house according to their expertise while externalizing those activities in which they lack experience. We find that management companies implementing an outsourcing policy, especially to offer investment fund styles that vary from those they manage in-house, will gain market share in terms of assets under management in the industry.

> *HYPOTHESIS 2: Fund families using outsourcing increase their market share more than those families managing every fund in-house, especially those using outsourcing for new styles of investment funds.*

Additionally, we provide some insights into why contractual agreements that help avoid the underperformance of outsourcing contracts may not be universally adopted within every sub-advisory agreement, which we observe in the empirical data. We must understand that it is not always possible to establish such a mechanism (for example, in some cases it may not be possible to find a prestigious sub-advisor prepared to sign a co-branding agreement with a less prestigious fund or with a limited channel of distribution). In any case, establishing these mechanisms has a non-zero negotiation

cost. Prior research in contract theory has shown that i) as the number of clauses in the contract increases, it becomes more expensive to write the arrangement (Balakrishnan and Wernerfelt (1986)); and ii) the more complex the contracts, the more expensive it becomes to manage the relationship with the outsourcing partner (Williamson (1991)).

This effort can lead management companies to consider establishing the mechanism only in a case in which poor performance can lead to fund outflows. If investors in a certain fund are expected to be unsophisticated with no reaction to poor performance, the management company may not be interested in implementing costly mechanisms to avoid underperformance. Furthermore, Del Gercio et al. (2010) evidence that funds distributed through direct channels are aimed toward sophisticated investors; when they are outsourced, they must pay a higher fee to the sub-advisor because they require more active management and greater reliability. This reinforces the idea that costly contractual arrangements are only of interest if the investor is sophisticated enough to understand the potential conflicts in outsourcing contracts.

> *HYPOTHESIS 3: Mechanisms to avoid problems of conflict of interest are mainly used in the case of funds with shareholders who have high levels of sophistication and information.*

3. Data Description and Summary Statistics

3.1. Data Sources

We examine actively managed U.S. mutual funds during the period 1996-2011. The data come from two sources: filings for mutual funds (NSAR) required by the SEC and the Center for Research in Security Prices (CRSP) Survival-Bias-Free U.S. mutual fund database. Data on advisors, sub-advisors, advisory arrangements and types of fees come from the NSAR filings. Fund returns, total net assets, turnover, expenses and other available fund characteristics come from CRSP.

Under the Investment Company Act of 1940, every investment company must register with the SEC. All U.S. mutual funds and other regulated investment management companies are required to file NSAR Forms (along with other documents) on a semi-annual basis. Form NSAR-A covers the first six months of the fiscal year for an

individual investment management company, and Form NSAR-B covers the full year. A mutual fund family, also known as a family complex, is composed of several mutual fund series, each of which (also known as a fund trust) may consist of several mutual funds. Each mutual fund series is legally formed as an investment company. Thus, each family complex may file several distinct NSAR forms for each of its fund trusts along with detailed information about each of its mutual funds.

To create our database, we first downloaded and parsed all NSAR-B filings available from the SEC's EDGAR database – a total of 55,315 files. Although certain funds voluntarily filed their reports prior to the mandatory disclosure period (there were filings available from 1993), the data began to appear consistently in 1996. To mitigate any selection bias, our sample begins with 1996. Our dataset is the entire population of the U.S. open-ended mutual fund market from 1996 to 2011.[9] The NSAR filings allow us to extract a substantial amount of information that is unavailable in other databases, such as sub-advisor names, advisory fees and advisory contracts.

The CRSP database has information about multiple fund classes issued by a particular fund. These classes, typically denoted A, B and C, have the same underlying portfolio. The main difference between them is the fee structure. Our observations are made at the class level. We group data by observation at the fund level, following the literature (e.g., Gaspar et al. (2006) and Nanda et al. (2004)). If the fund has multiple classes, the TNA of the fund is the sum of all TNA over all classes. We aggregate returns, weighting each class by total net assets (TNA). Turnover and expenses are aggregated at the fund level by weighting each class with its total net assets; for fund age, we select the oldest from among all classes. Finally, to merge the CRSP and NSAR data, we use a fuzzy match procedure that utilizes Weighted Jaccard Distances; it is discussed in the technical appendix.

[9] From the initial 55,315 filings, we drop the corresponding filings for 1994 and 1995 and filings where no names for the trust appear, obtaining a sum of 43,537 filings. In addition, we do not consider index funds or those missing an advisor name.

3.2. Summary Statistics

Table I reports by year the number of sub-advised funds managed by an unaffiliated company and the proportion of the different types of sub-advisory agreements in our sample. The affiliation data among investment management firms (in our case, between advisor and sub-advisor) come from the SEC website, where the firm name, the last filing date, issuer relationships, owner relationships, affiliate relationships, group members, and filing-agent relationships can be searched.[10] The literature on outsourcing in mutual funds does not consider affiliated sub-advised funds to be outsourced funds, affiliated sub-advised funds are considered to be in-house funds. We follow this approach and hereinafter we will refer to sub-advised funds as unaffiliated funds.

The figures show that the proportion of sub-advised funds has grown approximately 50% over the past two decades, from 12.6% in 1996 to 18.8% in 2011. Other studies have found similar figures. For example, Cashman and Deli (2009) show that 13.6% of sub-advised funds in 2002 were unaffiliated, whereas Del Guercio et al. (2010) find that it is 18%. A report from the Independent Directors Council, "Board Oversight of Sub-advisors" (2010), states, "as of April 2009, nearly 40% of mutual funds use at least one sub-advisor to manage the fund's portfolio, compared to 25%, 10 years ago". These figures are higher because outsourced funds include also the affiliated funds.[11]

Columns 4 to 8 of Table I focus on sub-advised funds (column 3) and report, respectively, the percentage of sub-advised funds with a potential conflict of interest (when the sub-advisor (agent) is also the principal advisor of other funds in its family), the percentage of sub-advised funds using a co-branding model, those with multi-manager arrangements, those funds using performance-based fees and finally funds using any of the sub-advisory agreements previously mentioned.[12] It can be observed that funds with a potential conflict of interest represent approximately half of all sub-

[10] Firms' affiliations have been accurately cross-checked using firm websites, financial news and company annual reports.
[11] Our data are also consistent with this statement. By the end of 2009, sub-advised funds (affiliated and unaffiliated) accounted for 41.9% of total funds in our sample, while in 1999, this number was 25.6%.
[12] Although these categories are not legally mutually exclusive, we observe that less than 1% of our sample combines two or more of these mechanisms.

advised funds and have increased from approximately 30% to 50% during the sample period.

Co-branded funds represent almost 14% of all external funds. We can also observe that hiring more than one sub-advisor for the management of the funds is a common approach. This practice has been adopted by between 10% and 33% of the total sub-advised funds over our sample period.[13] Performance-based fees have been carefully applied in the industry, and they are used by approximately 3% to 6% of the outsourced funds. On average, approximately 35% of outsourced funds use at least one of these mechanisms.[14]

Table I: Sub-advising Contracts over Time: Portfolio Level

This table reports the number of sub-advised funds as well as the proportion of each type of sub-advisory agreement over the period 1996-2011 for all U.S. open-end funds. The *Conflict of Interest* column contains the percentage of sub-advised funds in which the sub-advisor is also the principal advisor for its own funds. *Co-branding* refers to funds that use the sub-advisor's reputation by including the sub-advisor's name in the fund's name. *Multi-advising* refers to funds sub-advised to more than one sub-advisor. *Performance fee* applies when the sub-advised fund charges a floating fee that depends on prior fund performance. These three columns are shown as a percentage of the sub-advised funds. The last column (*Mechanism*) indicates the proportion of sub-advised funds that use any of the contractual agreements (co-branding, multi-advising and/or performance fee).

Year	All Funds	Sub-advised	Conflict of Interest	Co-branding	Multi-advising	Performance-fee	Mechanism
1996	2562	322	29.19%	9.01%	10.87%	3.11%	22.36%
1997	2799	339	33.92%	12.68%	10.91%	3.54%	26.55%
1998	2928	358	28.77%	13.41%	17.88%	2.79%	33.52%
1999	2924	354	30.23%	16.38%	16.67%	2.54%	35.03%
2000	3235	378	41.27%	16.14%	20.11%	3.17%	37.30%
2001	2919	342	52.34%	11.40%	17.84%	4.09%	28.36%
2002	3125	404	52.48%	10.40%	24.26%	4.21%	34.16%
2003	3032	433	53.81%	15.01%	32.33%	4.85%	44.11%

(Continued)

[13] We consider mutual funds managed by more than one firm as having multi-manager sub-advisory arrangements (i.e., the principal advisor has hired more than one unaffiliated sub-advisor). We do not consider as multi-managed funds those that are partially managed by a principal advisor and jointly managed with one sub-advisor.

[14] Because prior research has claimed that a significant portion of mutual fund investors are unsophisticated, the moderate use of these contracts is consistent with the fact that they are costly and hence used only to avoid outflows from sophisticated investors.

2004	2851	387	45.99%	17.31%	31.27%	5.68%	46.51%
2005	2687	374	46.26%	14.97%	21.39%	4.01%	36.36%
2006	2464	328	53.66%	14.63%	27.44%	4.88%	41.77%
2007	2382	345	52.46%	13.04%	22.03%	3.48%	36.23%
2008	2371	362	48.34%	15.19%	23.20%	6.35%	41.44%
2009	2469	414	48.79%	15.46%	19.57%	4.35%	36.23%
2010	2280	388	47.16%	13.40%	19.59%	3.61%	34.79%
2011	2196	412	49.62%	12.37%	19.89%	3.76%	33.60%
Average	2702	371	44.64%	13.80%	20.95%	4.03%	35.52%

Table II reports the time-series averages of the monthly cross-section of fund characteristics in Panel A, principal advisor characteristics in Panel B and sub-advisor characteristics in Panel C. These characteristics belonging to funds or companies are computed across different groups and shown in the columns: all funds (or all companies), funds managed in-house (or companies with at least one fund managed in-house), sub-advised funds (or companies with at least one sub-advised fund), sub-advised funds with a potential conflict of interest, co-branding, multi-advising, or performance fees and funds (companies) using any of these mechanisms.[15]

The variables analyzed in Panel A are as follows: Fund TNA measures total net assets under management in millions of dollars; Fund Size is the natural logarithm of TNA; Family Size is the logarithm of TNA for all funds in the family, excluding the fund itself; Family Funds indicates the logarithm of the number of funds in the family, excluding the fund itself; Fund Age is the number of years since inception; Distribution Fee is the percentage of assets the fund charges for distribution and marketing under the 12b-1 fee; Expenses are the total annual expenses and fees divided by the year-end TNA; Turnover is the minimum aggregate purchases and sales of securities divided by average TNA over the calendar year; Flow is a percentage that represents new inflows into the fund over the previous year; and Gross Returns indicates the funds' return from the previous year before the fee. We can observe that sub-advised funds are smaller, younger and more expensive than in-house managed funds. Moreover, they have higher turnover, lower flows and lower returns.

[15] All variables are winsorized at the 1st and 99th percentiles.

Our results are consistent with Chen et al. (2013) regarding size, turnover, age flows and past returns and with Duong (2010), who shows that sub-advised funds are more expensive. Within these sub-advised funds, we can observe that funds with performance fees tend to be of small size and that, in general, funds with mechanisms are a bit larger than the average size of sub-advised funds. Co-branded funds have higher distribution fees and fund expenses along with turnover rates similar to those of in-house funds. Performance fee funds have higher yearly returns, but their flow levels are quite small.

Panels B and C summarize the characteristics of management companies acting as advisors and sub-advisors, respectively. Firm Expenses measures the weighted average objective-adjusted expenses computed across all funds in the firm. Firm Return is defined as the objective-adjusted firm gross return. Top 5 Firms is an indicator variable that equals 1 if the management company has at least one fund that is performing in the top 5% of all funds with a particular investment objective. Funds Started indicates the number of funds started by the company in a given period. Firm Funds is the logarithm of the number of funds of the firm. Firm Turnover is defined as the average objective-adjusted turnover computed across all funds in the company. Firm Experience is the natural logarithm of the number of years of existence for the management company. Firm Size is the logarithm of TNA for all firm funds.

The figures indicate that firms with a sub-advising policy (management companies with at least one outsourced fund) are larger, have more experience, are better placed in the market in terms of top funds and are able to launch more funds than those without any sub-advised fund (3.23 compared with 0.317). While there is not much difference between firms that outsource their funds to sub-advisors with and without a potential conflict of interest, the sub-advisors that are actually managing these funds are larger, have more experience in the industry, have more top-performing funds and charge lower fees.

Table II: Mutual Funds and Management Company Characteristics

Table III reports the time-series average of the monthly cross-sectional averages of fund characteristics (Panel A), principal advisor characteristics (Panel B) and sub-advisor characteristics (Panel C). These averages are computed across the different segments shown in the columns: all funds (companies in Panels B and C), funds managed in-house (companies with at least one fund managed in-house in Panels B and C), sub-advised, sub-advised with potential conflict of interest, co-branding, multi-advising, performance fee or with any of these arrangements. **Fund TNA** measures Total Net Assets (TNA) under management in millions of dollars. **Fund Size** is the natural logarithm of TNA under management in millions of dollars. **Family Size** is the logarithm of TNA for all funds in the family, excluding the fund itself. **Family Funds** indicates the logarithm of the number of funds in the family, excluding the fund itself. **Fund Age** is the number of years since inception. **Distribution Fee** is the percentage of assets that the fund charges for distribution and marketing under the 12b-1 fee. **Expenses** are the total annual expenses and fees divided by the year-end TNA. **Turnover** is the minimum of aggregate purchase and sale of securities divided by the average TNA over the calendar year. **Flow** is a percentage that represents new inflows into the fund over the previous year. **Gross Returns** is the fund's past year's return before fee. **Firm Expenses** are weighted average objective-adjusted expenses computed across all funds in the firm. **Firm Return** is the objective-adjusted firm gross return. **Top 5 Firms** is an indicator variable that equals 1 if a management company has at least one fund that is performing in the top 5% of all funds with a particular investment objective. **Funds Started** is the number of funds started by the company in a given period. **Firm Funds** is the logarithm of the number of funds of the firm. **Firm Turnover** is the average objective-adjusted turnover computed across all funds in the company. **Firm Experience** is the natural logarithm of the number of years of existence for the management company. **Firm Size** indicates the logarithm of TNA for all funds of the firm. All variables are winsorized at the 1st and 99th percentiles.

PANEL A: Mutual Fund Characteristics

	All	In-house	Sub-advised	Conflict	Co-branding	Multi-advising	Performance-fee	Mechanism
Fund TNA ($ millions)	726.668	818.234	320.760	306.780	368.279	359.333	262.703	361.796
Fund Size (log TNA)	4.261	4.345	3.887	3.894	3.814	4.240	3.785	4.067
Family Size (log family TNA)	8.679	8.779	8.233	8.334	8.422	8.315	8.538	8.386
Family Funds (log # of funds)	3.386	3.412	3.273	3.386	3.400	3.173	3.595	3.274
Fund Age (years)	9.447	9.787	7.963	7.887	7.070	8.313	7.709	7.854
Distribution Fee (% per year)	0.210	0.207	0.225	0.212	0.241	0.197	0.104	0.201
Expenses (% per year)	1.163	1.131	1.316	1.322	1.374	1.316	1.366	1.338
Turnover (% per year)	101.45	98.49	114.76	110.84	98.56	106.89	107.99	103.03
Flow (% per year)	51.21	52.01	47.55	46.91	40.03	49.28	14.21	44.33
Gross Returns (% past year)	6.862	6.921	6.571	6.192	6.125	6.474	7.043	6.704

(Continued)

Table II – *Continued*

PANEL B: Management Company (Advisor) Characteristics

	All	In-house	Sub-advised	Conflicted	Co-branding	Multi-advising	Performance-fee	Mechanism
Firm Expenses (include loads, objective-adjusted)	0.181	0.109	0.220	0.221	0.263	0.219	0.323	0.214
Firm Return (% monthly objective-adjusted)	-0.006	-0.002	-0.008	-0.010	0.001	-0.015	0.003	-0.008
Top 5 Firms (%)	77.96	63.70	85.48	88.82	94.90	91.29	97.02	90.63
Funds Started (number of funds)	2.226	0.317	3.233	4.219	6.065	5.818	10.932	4.365
Firm Funds (log number of funds)	1.505	1.076	2.395	2.683	2.932	2.722	3.112	2.697
Firm Turnover (% objective-adjusted)	18.20	21.16	16.62	16.01	12.18	12.60	5.86	16.84
Firm Experience (log years)	1.723	1.581	1.796	1.849	1.944	1.946	2.173	1.861
Firm Size (log TNA)	7.924	7.489	8.207	8.341	8.620	8.502	8.746	8.524

PANEL C: Management Company (Sub-advisor) Characteristics

	-	-	Sub-advised	Conflicted	Co-branding	Multi-advising	Performance-fee	Mechanism
Firm Expenses (include loads, objective-adjusted)			0.173	0.129	0.154	0.107	0.009	0.136
Firm Return (% monthly objective-adjusted)			-0.014	-0.011	-0.003	-0.006	-0.010	-0.006
Top 5 Firms (%)			67.43	86.28	91.27	87.62	94.56	84.34
Funds Started (number of funds)			1.892	4.757	7.300	7.014	10.735	5.447
Firm Funds (log number of funds)			3.127	4.423	5.105	4.897	5.982	4.428
Firm Turnover (% objective-adjusted)			16.73	7.06	1.02	4.82	-4.44	7.88
Firm Experience (log years)			1.510	1.892	1.997	1.995	2.187	1.899
Firm Size (log TNA)			8.684	10.417	11.034	10.836	12.022	10.288

4. Contractual Arrangements for Outsourcing

We start this section by comparing the performance of funds managed in-house and that of outsourced funds with a potential conflict of interest to draw some conclusions on the underperformance of these externally managed funds. Later, we examine whether this inferior performance can be mitigated using sub-advisory arrangements such as co-branding, multi-manager systems or performance-based fees.

Given that our variables of interest from CRSP have a monthly frequency, we convert all variables extracted from the NSAR-B filings from a yearly to a monthly basis. For each mutual fund, we compute risk-adjusted returns (α_i) before expenses using several different models: the Capital Asset Pricing Model (1F), the Fama-French 3-factor model (3F), Carhart's (1997) four-factor model (4F), and an international five-factor model (5F) that adds the MSCI World Index return factor to the four factor model. Apart from these, we use two additional performance measures including some income indexes to correctly evaluate the balanced and fixed income funds in our dataset; this creates a new model based on Carhart's four-factor model (4F) and the MSCI World Index return factor (5F) but also including the U.S. Aggregate Bond Index returns in excess of the risk-free rate (6F). Also, we estimate alphas from a 9-Factor model (9F), which includes the four-factor model and five additional risk factors: Barclays US Treasury Bill 1-3 Months, Barclays US Treasury 1-3 Years, Barclays US Government Long, U.S. Corporate High-Yield and U.S. Corporate AAA.[16]

4.1. The Effect of Contractual Arrangements on Fund Performance

In this first subsection, we test the overall effect of using any contractual arrangement (co-branding, multi-advising or performance fee) on outsourced funds with agency issues. To achieve this, we need to consider the three different mechanisms presented

[16] The CRSP value-weighted stock index net of the one-month treasury rate (Rm) is used as the market factor. The SMB (size factor), HML (book-to-market factor) and WML (momentum factor) factors are obtained from Kenneth French's website. The MSCI World and Bond Index data are from Bloomberg. For each month, we computed the fund's risk-adjusted return using data covering the previous 24 months because many of these sub-advised funds might be close in the short run because of a poor management, and requiring more observations could bias our results toward older and better managed funds. However, alphas were also computed using the previous 36 observations (with a minimum of 30) and the main conclusions did not change.

earlier as a single mechanism and run the following regressions using Fama-MacBeth, Pooled OLS and Pooled OLS with Sub-advisor Fixed Effects:

$$Performance_{j,t} = \beta_0 + \beta_1 Conflict_{j,t-1} + \beta_2 Mechanism_{j,t-1} + \beta_3 Conflict_{j,t-1} * Mechanism_{j,t-1} + \beta_4 X_{j,t-1} + u_{j,t}, \quad [1]$$

where $Performance_{jt}$ is the alpha of fund j in month t, β_0 is the intercept, $Conflict_{jt-1}$ is a dummy variable indicating whether fund j was sub-advised by a firm that was also managing its own funds in month t. $Mechanism_{j,t-1}$ is a dummy variable with value 1 if the sub-advised fund has arranged either a co-branding model, multi-advisors or a performance fee structure. As we observed in Table II, several characteristics can be correlated with outsourcing and might predict performance. For example, small funds with high turnover are more likely to be outsourced, therefore, we must control for them. X_{jt-1} is a set of 1 period lagged control variables defined in Subsection 3.2 (*Fund Size, Family Size, Family Funds, Fund Age, Distribution Fee, Expenses, Turnover, Flow and Past Returns*). The subscript j corresponds to all U.S. open-end funds in our sample. We also adjust for serial correlation by applying Newey-West (1987) estimates of standard errors with lags of order three in Panel A, and we cluster the standard errors at the fund and family level in Panels B and C, respectively. We also include fund-investment-style dummies to avoid concerns about potential correlation between the fund style and performance and time dummies in Panel B and C.[17]

The estimated parameters of equation [1] are displayed in three different panels in Table III.[18] We can observe that independent of the estimation approach followed and consistent with prior literature, funds with potential conflicts underperform other funds

[17] We employ the most detailed level of classification available provided by Lipper, but we aggregate multiple objectives into broader categories. We end up with the following fund categories: Asian equities, balanced, convertible bonds, corporate bonds, emerging market equity, equity income, European equity, global bonds, global equities, GNMA securities, government bonds, growth and income, growth, income, international bonds, international equities, large-cap equity, mid-cap equity, money market, multi-cap equity, municipal bonds, small-cap equity, commodities, consumer, environment, finance, healthcare, materials, natural resources, specialty precious metals, specialty real estate, technology, utilities and other.

[18] To save space, we only show results using the performance measure from a 6-factor model (Carhart's model augmented by an international index and a global bond index). The results are very similar to the other performance measures; they are available in the supplementary appendix section.

(the underperformance is between 30.6 and 63.6 bps per year). To test our first hypothesis, we must examine the coefficient of their interaction, as it determines the marginal effect of using a mechanism contract for funds with a potential conflict of interest. As we expected, the β_3 coefficient is positive and statistically significant. The conflict of interest again has a negative impact on performance of between 43.9 bps (-0.0366*12) and 79.6 bps (-0.0664*12) per year. However, the use of mechanisms leads to a marginal increase in fund performance of between 60.1 bps (0.0501*12) and 76.6 bps (0.0638*12) per year compared to similar funds managed externally with a potential conflict of interest but not using this type of contractual arrangement.

The employment of any mechanism in general is not statistically significant, as was expected, because they should provide an improvement only when there is an agency problem. Moreover, we must note that this parameter compares the performance of any outsourced fund using a mechanism (being in conflict or not) against the remaining mutual funds in the sample (including in-house or external funds without a mechanism). There is no theoretical reason driving us to think that an external fund with a mechanism should outperform either the in-house funds or the external funds without a conflict of interest and without a mechanism, so in general, that parameter should be insignificant.

In general, the coefficients for the set of control variables are also consistent with prior studies. Fund size is negatively related to fund performance, in line with the idea that fund size is associated with liquidity and organizational diseconomies (Chen et al. (2004)). The weak significant might be associated with our inclusion of international stocks and bonds. Ferreira et al. (2013) find a positive relation between size and performance for the case of international funds. Family size and past returns are positive and statistically significant, which is also consistent with prior literature (Chen et al. (2004)). Age and Flows are positive and statistically significant, and Expenses is not significant; these are also both consistent with prior research, as we are considering fund returns gross of fees. After controlling for all these fund and family characteristics, outsourced funds with a potential conflict of interest are still underperforming those managed in-house.

Table III: Sub-advising Mutual Funds Using Mechanisms

Table X presents results for monthly Fama-MacBeth (1973) estimates (Panel A), pooled OLS (Panel B) and panel sub-advisor fixed effect (Panel C) of risk-adjusted returns on fund characteristics. The sample contains all U.S. mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured using the alpha from Carhart's model augmented by an international index and a global bond index (6F). **Conflict** is a dummy variable that equals 1 if the fund is sub-advised by an unaffiliated firm that also manages its own funds and 0 otherwise. **Mechanism** is a dummy variable equal to 1 if the fund is sub-advised using co-branding, multi-manager or performance-fee arrangements and 0 otherwise. The iteration term **Conflict*Mechanism** is also included to examine the effect that these mechanisms exert over conflicted funds. Control variables previously described in Table II are lagged 1 period. Time and Investment Style dummies are included but not reported, and the constant term has been omitted. Standard errors are clustered at the fund (Panel B) and sub-advisor (Panel C) level. The t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987) in Panel A). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance					
	(Panel A) Fama Mac-Beth		(Panel B) Pooled OLS		(Panel C) Sub-advisor FE	
Conflict*Mechanism		0.0638**		0.0501**		0.0592**
		(2.32)		(2.35)		(2.39)
Conflict	-0.0530***	-0.0664***	-0.0255**	-0.0366***	-0.0450***	-0.0462***
	(-4.64)	(-6.70)	(-2.32)	(-2.58)	(-2.61)	(-2.80)
Mechanism		-0.0099*		-0.0202		-0.0114
		(-1.83)		(-1.26)		(-0.65)
Fund Size (log TNA)	0.0001	0.0027	0.0045	0.0045	0.0015	0.0016
	(0.02)	(1.01)	(0.37)	(0.34)	(0.73)	(0.79)
Family Size (log family TNA)	0.0112***	0.0109***	0.0090***	0.0088***	0.0011	0.0022
	(4.32)	(4.50)	(2.79)	(2.72)	(0.25)	(0.48)
Family Funds	-0.0150***	-0.0167***	-0.0101*	-0.0097	-0.0065	-0.0081
	(-2.90)	(-3.95)	(-1.65)	(-1.59)	(-0.69)	(-0.87)
Fund Age	0.0093	0.0082	0.0088	0.0088	-0.0011	-0.0008
	(1.04)	(1.23)	(1.22)	(1.21)	(-0.15)	(-0.10)
Distribution Fee	-0.0724**	-0.0774***	-0.0877***	-0.0881***	-0.1248***	-0.1236***
	(-2.46)	(-4.00)	(-5.15)	(-5.16)	(-6.51)	(-6.44)
Expenses	0.0480	0.0633***	0.0706***	0.0708***	0.0939***	0.0926***
	(1.44)	(2.98)	(5.18)	(5.19)	(6.52)	(6.44)
Turnover	0.0051	0.0079	-0.0051**	-0.0051**	-0.0028	-0.0028
	(1.39)	(1.10)	(-2.36)	(-2.35)	(-1.31)	(-1.29)
Flows	0.0135***	0.0159***	0.0128***	0.0128***	0.0116***	0.0116***
	(3.02)	(6.99)	(7.36)	(7.36)	(7.05)	(7.06)
Past Returns	0.0161***	0.0121***	0.0088***	0.0088***	0.0047***	0.0047***
	(4.88)	(5.63)	(7.52)	(7.51)	(4.05)	(4.04)
Style Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	No	No	Yes	Yes	Yes	Yes
Observations	346481	346481	346481	346481	346481	346481
R^2	0.086	0.146	0.060	0.067	0.170	0.172

4.2. Co-branding, Multi-advising and Performance-fee Contracts on Sub-advised Funds

In this sub-section, we examine the effect that each contractual arrangement has separately on fund performance.

4.2.1. Co-branding

First, we test whether the underperformance of sub-advised funds is mitigated when the sub-advisor's reputation is at stake. This could happen when the principal advisor associates with a sub-advisor to take advantage of the sub-advisor's reputation and includes, for example, the sub-advisor's name in the mutual fund's name to attract new investors. In these circumstances, the sub-advisor should manage the external portfolio better because its own industry reputation and image are at stake. To test whether this co-branding model can positively influence the management of sub-advised funds under conflict of interest, we run the following Fama-Macbeth regression:

$$Performance_{j,t} = \beta_0 + \beta_1 Conflict_{j,t-1} + \beta_2 CoBranding_{j,t-1} + \beta_3 Conflict_{j,t-1} * CoBranding_{j,t-1} + \beta_4 X_{j,t-1} + u_{j,t}, \quad [2]$$

where $CoBranding_{j,t-1}$ is a dummy variable that equals 1 if the fund uses a co-branding model of sub-advising and $Conflict_{j,t-1} * CoBranding_{j,t-1}$ is an interaction term.[19] We also include investment style dummies. We expect that coefficient β_2 will not be statistically significant, as it measures the effect of the co-branding mechanism in general (so it is measuring the effect of being a sub-advised fund and having a co-branding mechanism against the remaining funds, including the in-house managed funds) but that β_3 will be positive and statistically significant because it measures the marginal effect of using the co-branding mechanism when the outsourced fund is managed by a sub-advisor that is also managing its own mutual funds.

Table IV (Panel A) reports the estimation results for the regression specification given in equation [2]. The coefficient for the variable $Conflict$ is negative and statistically significant, showing that the conflict of interest previously identified negatively impacts performance. In addition, we observe that funds managed externally no longer underperform funds managed in-house when they are under a co-branding arrangement (the coefficient for *CoBranding* is in general positive). However, to test our first

[19] One might argue that even though an external fund is managed by a company that manages its own funds, these are not really subject to a conflict unless the funds have the same investment objective. As a robustness check, the sub-advised variable was refined to only consider those sub-advised funds that share the same investment objective for the in-house and external portfolios, and the results remained unchanged. We do not report those tables here to save space, but they are available upon request.

hypothesis, we must examine the coefficient of their interaction, as it determines the marginal effect of using a co-branding model for funds with a potential conflict of interest. As we expected, the β_3 coefficient is positive and statistically significant. The conflict of interest has a negative impact on performance of between 53.76 bps (-0.0448*12) and 88.92 bps (-0.0741*12) per year. However, the use of a co-branding model leads to a marginal increase in fund performance of between 55.68 bps (0.0464*12) and 80.52 bps (0.0671*12) per year compared to similar funds managed externally that also have a potential conflict of interest but do not use this type of contractual arrangement. Thus, we confirm that when the sub-advisor has recognized status in the industry, the fund family can use a co-branding model to capitalize on the sub-advisor's reputation. In this case, although the sub-advisor faces a conflict of interest, it will try to perform well to maintain its reputation in the industry. This result is consistent with Hayek (1948) and Marshall (1949), who suggest that "firm reputation" and "brand names" are mechanisms that provide incentives to avoid underperformance.[20]

4.2.2. Multi-advising

To analyze whether outsourcing contracts with more than one sub-advisor can reduce or eliminate the observed underperformance, we estimate the following equation:

$$\begin{aligned} Performance_{j,t} &= \beta_0 + \beta_1 Conflict_{j,t-1} \\ &+ \beta_2 Multi\_Advising_{j,t-1} + \beta_3 Conflict_{j,t-1} \\ &* Multi\_Advising_{j,t-1} + \beta_4 Num\_Sub_{j,t-1} + \beta_5 X_{j,t-1} \\ &+ u_{j,t}, \end{aligned} \quad [3]$$

where $Multi\_Advising_{j,t-1}$ is a dummy variable that equals 1 if the fund uses a multi-manager model of sub-advising, $Conflict_{j,t-1} * Multi\_Advising_{j,t-1}$ is the interaction

[20] We hypothesize that co-branding mitigates underperformance based on the idea that managing external funds and achieving poor performance can affect the reputation of the sub-advisor. If this is true, the effect should be stronger for those sub-advisors that have a higher reputation in the market. In an unreported table, we redefine the co-branding variable using only the most prestigious sub-advisors in terms of size and past performance (specifically, we considered only the largest sub-advisors (top 20% of management companies in terms of size (TNA)) and the highest performing sub-advisors (top 20% of management companies in terms of historical performance). The marginal improvement in performance for the largest sub-advisors and the top performing funds was much larger than the improvements for co-branding funds in general.

term and $Num\_Sub_{j,t}$ is an additional control variable that represents the number of sub-advisors managing the fund.[21] We expect that coefficient β_2 will not be statistically significant, as it measures the effect of having several sub-advisors in general (so it is measuring the effect of being a multi-advising fund against the remaining funds, including the in-house managed funds); we have no hypothesis that leads us to assume that these multi-advising funds should achieve better performance than in-house funds. However, β_3 should be positive and statistically significant because it measures the marginal effect of using the multi-advising mechanism when the outsourced fund is managed under a conflict of interest.

Table IV (Panel B) shows the estimated regression coefficients from equation [3]. Again, we observe that being outsourced with agency issues leads to a drop in fund performance. In addition, as we expected, the performance of external funds with more than one sub-advisor does not differ from that of similar in-house funds, as the coefficient on the variable $Multi\_Advising$ is not statistically significant across all of the different specifications. The variable measuring the interaction between multi-managers and conflict is always positive and statistically significant; thus, in line with our second hypothesis, we confirm that entering into a sub-advisory contract with more than one sub-advisor helps to mitigate poor performance. While sub-advised funds underperform by between 23.76 bps and 59.64 bps per year, using multiple sub-advisors in the portfolio management of a fund with a potential conflict of interest improves performance by between 45.96 bps and 160.2 bps per year.

This finding is consistent with the prior literature related to general firm theory. For example, Bone et al. (1999) and Cooper et al. (2005) support the idea that groups are more efficient, act more rationally and achieve better performance than individuals. In the case of mutual funds, we provide an additional reason why using multiple sub-advisors may be beneficial that is based on the sub-advisors' increased risk of replacement. Multi-manager funds are exempted from the SEC regulations that permit them to terminate and appoint new unaffiliated sub-advisors without shareholder approval provided certain conditions (such as notice to shareholders within a specified

[21] In our database the average and mediam number of sub-advisors in multi-advisors contracts is 5.2 and 4.0, respectively.

period) are met.[22] This exemptive relief substantially reduces the time and cost of obtaining shareholder approval for each change of sub-advisors, which makes it easier to replace management firms. Such power could enable funds to monitor and control poor performance through threats of replacement, which might mitigate problems in the outsourcing contract.

4.2.3. Performance-based Fees

Several previous studies have shown that funds with performance-based fee contracts have superior performance – because of the monitoring effect that this fee structure requires – over funds with fees based solely on assets under management (Elton et al. (2003)). We wish to examine the effect of performance-based fees on funds managed by external firms and in particular, on those managed under a conflict of interest framework to examine whether this incentive mechanism mitigates the management monitoring issue. In Table IV (Panel C), we present estimations of the following equation:

$$\begin{aligned} & Performance_{j,t} \\ & = \beta_0 + \beta_1 Conflict_{j,t-1} \\ & + \beta_2 Performance\_fee_{j,t-1} + \beta_3 Conflict_{j,t-1} * Performance\_fee_{j,t-1} + \beta_4 X_{j,t-1} \\ & + u_{j,t}, \end{aligned} \quad [4]$$

where $Performance\_fee_{j,t-1}$ is a dummy variable that equals 1 if the external fund is under a fulcrum fee compensation structure. We expect that coefficient β_2 will not be statistically significant, as it measures the effect of being a sub-advised fund with a floating fee (so it is measuring the effect of being a sub-advised fund and having a performance fee mechanism against the remaining funds, including in-house managed funds) but that β_3 will be positive and statistically significant because it measures the marginal effect of using the performance fee when the outsourced fund is managed by a sub-advisor that is also managing its own mutual funds. From Panel C of Table IV, we can assess that sub-advised funds, in general, generate poorer performance than funds managed in-house, as β_1 is again negative and statistically significant. We observe that

[22] See exemption from Shareholder Approval for Certain Sub-advisory Contracts, SEC Release Nos. 33-8312, 34-48683, IC-26230.

β_2 is not statistically significant, as we expected, and we observe that consistent with our third hypothesis, sub-advised funds under a conflict of interest and using a performance fee arrangement achieve an improvement of 32.4 to 100.2 bps compared to all other conflicted funds.

Table IV: Sub-advising with Co-branding, Multi-advising and Performance-fee.

Table IV presents results for monthly Fama-MacBeth (1973) estimates of risk-adjusted returns on fund characteristics. The sample contains all U.S. mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance measured by the alpha from CAPM (1F), the Fama-French three factor model (3F), Carhart's 4 factor model (4F), Carhart's model augmented with an international index (5F) and a global bond index (6F) and Carhart's model augmented by 3 government bond indexes and 2 corporate bond indexes (9F). **Conflict** is a dummy variable that equals 1 if the fund is sub-advised by an unaffiliated firm that also manages its own funds and 0 otherwise. In Panel A, **Co-branding** is a dummy variable that equals 1 if the fund is sub-advised under a co-branding arrangement and 0 otherwise. In Panel B, **Multi-advising** is a dummy variable that equals 1 if the fund is sub-advised by more than one sub-advisor, and **Number of Sub-advisors** is the number of firms managing the fund. In Panel C, **Performance-fee** is a dummy variable that equals 1 if the sub-advised fund is under a fulcrum fee compensation structure. The iteration terms are also included to examine the effect that these mechanisms exert over conflicted funds. Control variables previously described in Table II are lagged 1 period. Investment Style dummies are included but not reported, and the constant term has been omitted. The t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987)). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance					
	ALPHA 1F	ALPHA 3F	ALPHA 4F	ALPHA 5F	ALPHA 6F	ALPHA 9F
Panel A: Co-branding						
Conflict*Co-branding	0.0671***	0.0573**	0.0577**	0.0464*	0.0613***	0.0584*
	(2.82)	(2.18)	(2.13)	(1.90)	(2.69)	(1.76)
Conflict	-0.0630***	-0.0448***	-0.0505***	-0.0684***	-0.0705***	-0.0741***
	(-5.22)	(-5.70)	(-5.89)	(-7.19)	(-7.11)	(-5.98)
Co-branding	-0.0087	0.0060	0.0221*	0.0286**	0.0536***	0.0480***
	(-0.55)	(0.40)	(1.68)	(2.03)	(3.64)	(2.93)
R^2	0.181	0.182	0.180	0.173	0.145	0.156
Panel B: Multi-advising						
Conflict*Multi-advising	0.1335***	0.0557*	0.0538*	0.0383*	0.0567**	0.0714**
	(3.06)	(1.74)	(1.84)	(1.76)	(2.01)	(2.32)
Conflict	-0.0497***	-0.0257**	-0.0198*	-0.0354***	-0.0292***	-0.0465***
	(-3.52)	(-2.55)	(-1.75)	(-3.03)	(-2.65)	(-3.79)
Multi-advising	-0.0143	-0.0206	-0.0204	-0.0213	-0.0367	-0.0473
	(-0.48)	(-0.74)	(-0.77)	(-0.83)	(-1.39)	(-1.28)
Number of Sub-advisors	-0.0157*	-0.0117	-0.0114	-0.0108	-0.0057	-0.0037
	(-1.73)	(-1.42)	(-1.47)	(-1.43)	(-0.77)	(-0.38)
R^2	0.116	0.121	0.121	0.113	0.089	0.094
Panel C: Performance-fee						
Conflict*Performance-fee	0.0498**	0.0238**	0.0312**	0.0835***	0.0820***	0.0270**
	(2.12)	(2.09)	(2.46)	(3.05)	(3.07)	(2.90)
Conflict	-0.0299***	-0.0077**	-0.0009**	-0.0180**	-0.0134*	-0.0246***
	(-3.92)	(-2.02)	(-2.11)	(-2.15)	(-1.78)	(-3.07)
Performance-fee	-0.0817	-0.0081	-0.0041	0.0015	0.0370	-0.0186
	(-1.41)	(-0.42)	(-0.24)	(0.08)	(1.28)	(-0.72)
R^2	0.249	0.251	0.248	0.238	0.179	0.181
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Style Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	346481	346481	346481	346481	346481	346481

4.3. Sub-advising Using Mechanisms: Pooled OLS and Sub-advisor Fixed Effects

In Panel A of Table V, we present pooled OLS regressions for equations [2] to [4] and in Panel B, we report the results of panel regressions with sub-advisor fixed effects. Adding sub-advisor fixed effects allows us to compare specific differences in performance between in-house and outsourced funds that are managed by the same company (the sub-advisor).

Overall, we observe the following: (1) external funds systematically underperform internally managed ones when both are managed by the same sub-advisor, (2) external funds with specific contractual arrangements do not systematically underperform in-house managed ones and (3) the use of mechanisms for outsourced funds under a conflict framework has a positive and significant impact on fund performance (in every case, the coefficient measuring the marginal effect of the mechanism when there is a conflict is positive and statistically significant). Thus, the different model estimations allow us to confirm that sub-advisors facing a conflict of interest generally underperform unless they enter into a co-branding, multi-advisor or performance fee arrangement, in which case they will try their best to outperform to maintain their reputation in the industry, keep the contract or obtain higher fees.

Table V: Sub-advising Mutual Funds with Co-branding, Multi-advising and Performance-fee Arrangements: Pooled OLS and Sub-adviser Fixed Effects

Table V presents results for monthly pooled OLS (Panel A) and sub-advisor fixed effects (Panel B) regression estimates of risk-adjusted returns on fund characteristics. The sample contains all U.S. mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured using the alpha from Carhart's model augmented by an international index and a global bond index (6F). Control variables previously described are lagged 1 period. Time and Investment Style dummies are included but not reported, and the constant term has been omitted. Standard errors are clustered at fund (Panel A) and sub-advisor (Panel B) levels, and the t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance					
	Panel A: Pooled OLS			Panel B: Sub-advisor Fixed Effects		
	Co-branding	Multi-advising	Performance-fee	Co-branding	Multi-advising	Performance-fee
Conflict	-0.0386***	-0.0234*	-0.0266**	-0.0375***	-0.0311*	-0.0305**
	(-3.51)	(-1.71)	(-2.34)	(-2.68)	(-1.86)	(-2.07)
Conflict*Co-branding	0.0993***			0.0682*		
	(2.70)			(1.86)		
Conflict*Multi-advising		0.0733**			0.0636*	
		(2.30)			(1.96)	
Conflict*Performance-fee			0.0671*			0.1056**
			(1.77)			(2.33)
Co-branding	0.0152			0.0192		
	(0.53)			(0.67)		
Multi-advising		-0.0494**			-0.0365	
		(-2.51)			(-1.53)	
Number of Sub-advisors		-0.0079*			-0.0053	
		(-1.90)			(-1.07)	
Performance-fee			-0.0324			-0.0604**
			(-1.47)			(-2.36)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Style Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.067	0.057	0.057	0.172	0.166	0.166
Observations	346481	346481	346481	346481	346481	346481

4.4. Testing for Reputation, Competitiveness and Incentives

Having shown a significant positive impact on performance when outsourcing contracts include clauses such as co-branding, multi-management or performance-based fees, which mitigate the agency issues of firms that simultaneously manage internal and external funds, we draw on the organizational literature to explain this phenomenon. Under the theory of Klein and Leffler (1981), brand reputation constitutes an implicit protection against adverse selection. We therefore expect outsourcing contracts with co-branding to effectively mitigate agency issues if the sub-advisor already constitutes a well-known brand in the industry. Additionally, these authors also provide evidence on self-enforcement mechanisms that assure performance by threatening termination of the relationship. The replacement risk faced by players in a multi-advising agreement will create a competitive environment in which only those sub-advisors that are able to deviate from the norm to outperform their peers will conserve the contract.

Finally, Holmstrom (1979), among others, analyzes performance-based contracts in the context of agency theory to solve problems of moral hazard and adverse selection. We

hypothesize that while outsourcing contracts are generally under agency issues because the management company might be managing internal and external funds simultaneously, one way to align incentives is to have a floating compensation structure based on performance. Although this compensation contract could generally work for every type of agent, we expect that it works better in those cases in which the principal has higher uncertainty about the agent's performance. Therefore, we hypothesize that this mechanism could be more effective within outsourcing contracts with inexperienced sub-advisors or sub-advisors with poor past performance.

Table VI reports the estimates from the following logistic regression:

$$\text{Prob}(y_{i,t} = 1) = \frac{\exp(\beta_f z_i)}{1+\exp(\beta_f z_i)}, \quad [5]$$

where $\beta_f z_i = (a_0 + a_1 I_{j,t-1} + a_2 X_{i,t-1} + \delta_t + T_t + e_{i,t})$. The dependent variable ($y_{i,t}$) is a dummy variable that equals 1 if the outsourced fund has a co-branding model in Panel A, a multi-advising contract in Panel B and a performance-based fee in Panel C. $I_{j,t-1}$ are the main explanatory variables and proxy for reputation, competitiveness and incentive alignment. $X_{i,t-1}$ is a vector of fund and family variables lagged one period. We include style dummies (δ_t) and time dummies (T_t). We cluster the standard errors at the fund level.

In Panel A, we explain the use of co-branding contracts with *Sub-advisor Performance*, measured as the objective-adjusted sub-advisor abnormal return and *Sub-advisor Experience*, the natural logarithm of the number of years that the sub-advisor has been in business. *Sub-advisor Performance* is calculated as follows[23]:

$$\sum_{j=1}^{J}[w_j(R_j - \sum_{i=1}^{I} w_i R_i)], \quad [6]$$

where w_j is the weight of a fund in the sub-advisory company, R_j is the gross return of fund j from the J funds of the sub-advisor, w_i is the weight of the fund in its investment objective and R_i is the gross return of fund i from the I funds within the style. These two coefficients are positive and statistically significant, with a marginal coefficient of 0.01

[23] This expression was used previously by Khorana and Servaes (2012) to measure performance in mutual fund families.

and 0.003, respectively. Considering the unconditional probability of being outsourced with these contractual agreements, a one standard deviation increase in sub-advisor performance (1.294) and sub-advisor experience (0.717) means that the funds are 61.6% (0.01*1.294/0.021) and 11.3% (0.003*0.717/0.019) more likely to have a co-branding arrangement than other funds, respectively. The greater the sub-advisors' reputation when measured by skill and experience, the higher the probability of being involved in a co-branding agreement.

In Panel B, we estimate the probability of an outsourced fund with a multi-advising contract using *Idiosyncratic* and *Beta Deviation* as explanatory variables. These variables are calculated as the differences (in absolute terms) between the actual value and the average of that period for all funds within the investment objective. The idiosyncratic risk is calculated as the standard deviation of the residual when estimating the Alpha 6F model (Carhart's model augmented by an international index and a global bond index), and the beta risk is the market beta from the same performance model. Both variables are proxies for competitiveness, and, as we expected, they are positively related to the use of multi-advising contracts[24], indicating that Klein and Leffler's (1981) assumption using about self-enforcement mechanisms to assure performance also holds in this case.

In Panel C, we use the experience of the sub-advisor and *Top 5 Sub-advisor*, which is an indicator variable that equals 1 if a sub-advisor has at least one fund that is performing in the top 5% of all funds in a particular investment objective, to explain the use of a contract that compensates external firms with a floating fee based on performance. The last panel of Table VI reports these estimates and confirms that less experienced sub-advisors without top funds are more likely to engage in these contracts as a way of preventing poor management. For example, sub-advisors unable to have at least a star fund, are 2/3 (0.006/0.009) more likely to be compensated according to their performance.

[24] Please note that because all of the variables are contemporaneous, we are not claiming that past higher deviations positively predict the use of multi-advising contracts but instead identify a simple positive relation, controlling for other variables, to evidence that under these contracts, portfolio managers tend to deviate more from others within the same style.

Table VI: Reputation, Competitiveness and Incentives

This table reports the estimates of monthly logistic regressions addressing whether external funds are under different contractual arrangements based on different sub-advisor, fund and family characteristics. The dependent variables are **Co-branding** (Panel A), **Multi-advising** (Panel B) and **Performance-fee** (Panel C) as previously described. The main explanatory variables are as follows: **Sub-advisor Performance** is the objective-adjusted sub-advisor abnormal return**, Sub-advisor Experience** is the natural logarithm of the number of years the sub-advisor has been in existence**,** and **Idiosyncratic** and **Beta Deviation** are standard deviation of residuals and the market beta based on F6, respectively. **Top 5 Sub-advisor** is an indicator variable that equals 1 if a sub-advisor has at least one fund that is performing in the top 5% of all funds with a particular investment objective**.** The remaining variables are a set of controls previously described. The sample contains U.S. mutual funds from 1996 to 2011. Time and investment-style dummies are included but not reported; t-statistics are reported in parentheses, and the constant term has been omitted. Average marginal effects and standard deviations are also shown, and the unconditional probability is described as the baseline predicted probability. Standard errors are clustered at the fund level. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Panel A				Panel B				Panel C			
	Co-branding & Reputation				Multi-advising & Competitiveness				Performance-fee & Incentives			
	Skill		Experience		Idiosyncratic Deviation		Beta Deviation		Experience		Top Funds	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
Sub-advisor Performance	0.021**	0.010**										
	(2.05)	1.294										
Sub-advisor Experience			0.445**	0.003**					-0.357***	-0.002***		
			(2.47)	0.717					(-2.61)	0.717		
Idiosyncratic Deviation					0.083***	0.102***						
					(4.20)	0.015						
Beta Deviation							0.437***	0.019***				
							(2.61)	0.283				
Top 5 Sub-advisor											-1.291***	-0.006***
											(-6.51)	0.480
Fund Size (log TNA)	0.012	0.000	0.037	0.000	0.066*	0.002*	0.034	0.001	0.027	0.000	0.036	0.000
	(0.28)	1.995	(0.61)	2.008	(1.77)	1.993	(0.86)	2.068	(0.35)	2.006	(0.48)	1.993
Family Size (log family TNA)	-0.105*	-0.002*	0.060	0.000	0.176***	0.005***	0.166***	0.007***	0.028	0.000	0.016	0.000
	(-1.77)	2.600	(0.90)	2.598	(3.98)	2.598	(3.36)	2.826	(0.26)	2.598	(0.18)	2.598
Family Funds	0.220	0.004	0.041	0.000	-0.505***	-0.015***	-0.479***	-0.020***	0.111	0.001	0.301*	0.001*
	(1.55)	1.220	(0.31)	1.214	(-5.31)	1.219	(-4.47)	1.300	(0.56)	1.213	(1.76)	1.219
Fund Age	-0.618***	-0.010***	-0.836***	-0.005***	-0.382***	-0.011***	-0.273**	-0.012**	-0.419	-0.002	-0.445	-0.002
	(-3.20)	0.530	(-3.75)	0.531	(-2.93)	0.530	(-1.97)	0.554	(-1.39)	0.529	(-1.52)	0.530
Distribution Fee	-0.712***	-0.012***	-0.931***	-0.006***	-0.648***	-0.019***	-0.434*	-0.018*	-3.637***	-0.019***	-3.631***	-0.017***
	(-2.92)	0.327	(-2.64)	0.327	(-3.06)	0.326	(-1.80)	0.324	(-4.33)	0.328	(-4.70)	0.327

(Continued)

Table VI- *Continued*

Expenses	0.731***	0.012***	0.922***	0.006***	0.481***	0.014***	0.231*	0.010*	0.916***	0.005***	0.913***	0.004***
	(5.44)	0.542	(5.49)	0.530	(4.47)	0.537	(1.87)	0.538	(4.13)	0.538	(4.62)	0.539
Turnover	-0.028	-0.000	-0.060	-0.000	0.000	0.000	-0.014	-0.001	-0.019	-0.000	-0.004	-0.000
	(-1.01)	1.818	(-1.10)	1.866	(0.02)	1.826	(-0.78)	1.790	(-0.53)	1.848	(-0.13)	1.821
Flows	0.002	0.000	-0.022	-0.000	-0.018	-0.001	-0.041	-0.002	-0.007	-0.000	-0.008	-0.000
	(0.15)	1.894	(-0.60)	1.778	(-0.84)	1.856	(-1.11)	1.868	(-0.16)	1.791	(-0.19)	1.852
Past Returns	0.022**	0.000**	0.021	0.000	-0.031***	-0.001***	-0.024***	-0.001***	-0.026**	-0.000**	-0.025**	-0.000**
	(2.16)	5.190	(1.32)	4.845	(-4.60)	5.127	(-3.29)	6.096	(-2.18)	5.028	(-2.03)	5.099
Time Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Style Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	346481		346481		346481		346481		346481		346481	
Pseudo R2	0.040		0.055		0.054		0.040		0.073		0.098	
Baseline Predicted Probability	0.021		0.019		0.038		0.051		0.009		0.009	

5. Outsourcing Policy, Market Share and Investor Sophistication

5.1. Outsourcing Decisions and Market Share

In this section, we examine whether management companies that engage in outsourcing contracts are able to increase their market share while offering a wider range of products, especially in those investment styles in which they have no previous experience. Previous studies of family decisions in mutual funds (Massa (2003) or Khorana and Servaes (2012), among others) find that families face incentives to increase the menu of funds offered to customers, in terms of both the number of funds and the range of investment objectives, to increase their market share. To proceed with our empirical tests, we need to aggregate funds to the family level, reducing our sample to family-month observations. We compute the market share at the family level as the sum of all assets under management by each management company divided by all assets under management in the industry during that period and regress it on the outsourcing decisions and fund family characteristics. We estimate the following regression model using different specifications:

$$\log(Market\ Share)_{i,t} = \beta_0 + \beta_1 Outsourcing\ Decisions_{i,t-1} + \beta_2 Market\ Share_{i,t-1} + \beta_3 X_{i,t-1} + u_{i,t} \quad [7]$$

$Outsourcing\ Decisions_{i,t-1}$ captures different decisions on outsourcing made by management company i in the previous month. $Market\ Share_{i,t-1}$ is the market share of family "i" in period t-1. We also control for a set of family characteristics $X_{i,t-1}$ during period t-1.

We use different variables to measure outsourcing decisions. Our data show that fewer than one third of management companies have at least one fund outsourced, hence, it appears that outsourcing decisions are taken at the family level. Thus, the variable used to measure these decisions is *Outsourcing Policy*, a dummy variable that equals 1 for management companies that are currently offering sub-advised funds and 0 otherwise. It is also important to differentiate between the type of funds that a firm is outsourcing, as we expect that outsourcing funds with investment objectives not yet offered by internal management would help to gain more market share.

We measure this outsourcing decision using the variable *Outsource New Style;* this variable takes the value 1 only if the management company is employing outsourcing to manage some of its funds, of which at least one belongs to a different investment style from those managed in-house. Therefore, this variable equals 1 if outsourcing is employed by the management company to offer new investment styles to its customers. Within those firms that decide to outsource some their funds, the number of funds externalized might vary across firms, so we will also measure this using *Ratio Outsourced Funds*, which is the proportion of sub-advised funds a management company currently holds over all of its funds.

The set of family characteristics (X_i) includes variables such as *Firm Expenses, Firm Performance* and *Firm Turnover*, which are weighted average objective-adjusted measures computed across all funds in the firm. These variables are weighted in the same fashion as in Khorana and Servaes (2012) based on equation [6] but replacing the fund returns with each variable of interest (funds expenses, 6 factor alphas and turnover, respectively). We also include some other control variables such as *Funds Started*, which measures the number of funds started by the company in a given period; *Firm Funds,* which is the logarithm of the number of funds of the firm; *Firm Experience*, calculated as the natural logarithm of the number of years a management company has been in existence; *Top 5% Performance,* which is an indicator variable that equals 1 if the family has at least one mutual fund that performs in the top 5% based on the fund's style; and *Herfindhal across Funds*, which is simply measured as the sum of the squared fractions of each fund's share in total management company assets.

We estimate the model using the Generalized Method of Moments (GMM) by Arellano and Bover (1995) and Blundell and Bond (1998), which is an augmented version of the difference GMM of the Arellano-Bond (1991) approach, to estimate equation [10].[25] Table VII reports the results of this regression in five different columns. Column 1 shows a positive (0.2532) and statistically significant coefficient for our variable of

[25] Kievit (1995), among others, demonstrates that ordinary least squares estimates are inconsistent when the lagged dependent variable is included in the specification model. As we are including the lagged market share as an independent variable (following Khorana and Servaes (2012)), we must estimate our model using the system GMM. We estimate a system of equations in both differences and levels. We employ the lagged values of the differences as instruments in the levels and the lagged values of the levels as instruments in the difference equation.

interest *Outsourcing Policy*. This suggests that a change in the outsourcing policy of a management company (shifting from not using to using outsourcing) implies an increment in its market share of approximately 28.8% [$e^{0.2532}$ -1]. So, for example, in a family with market share of 15% before implementing an outsourcing policy, the new policy of sub-advising will lead to a greater market share of 19.32% [0.15*(1+0.288)*100]. Moreover, we also find that firm experience and the number of funds in the family positively affect market share, consistent with the previous literature.

Outsourcing decisions will have a positive impact on market share as long as the externalized funds have different investment objectives from those funds already managed in-house. Therefore, we would expect the coefficient of our variable *Outsource New Style* to be positive. Column 2 shows that effectively, this coefficient is positive and statistically significant (coefficient: 0.1555, p-value: 0.03). In column 3, we include both *Outsourcing Policy* and *Outsource New Style*, their coefficients (0.1008 and 0.1409 respectively) being positive and statistically significant. Thus, while the outsourcing decisions are shown to contribute positively to the gain in market share, the outsourcing of funds in a new investment style (different from those being managed in-house) will help even more to increase the management company's market share. In economic terms, while having an outsourcing policy allows the management company to increase its market share from the 15% of our prior example to 16.59% [0.15*$e^{(0.1008)}$*100], if the outsourcing involves offering a new investment style, the increment would reach up to 19.10% [0.15*$e^{(0.1008+0.1409)}$*100].[26]

In column 4, we consider the proportion of outsourced funds (*Ratio Outsourced Funds)*, observing also a positive (0.757) and statistically significant coefficient. The economic interpretation of this number is that an increase of one standard deviation in the proportion of outsourced funds (0.266) will lead the advisor's market share to increase 22.3% [$e^{0.757*0.266}$ -1]. Using the prior example, a family with a market share of 15% that changes the proportion of outsourced funds from the average (0.186) to one

[26] We checked whether there is second-order serial correlation of the error term and for the validity of the instruments using the Hansen test. The tests confirm that the error term is serially uncorrelated and that the instruments used in the GMM are exogenous, respectively.

standard deviation higher, 0.452 [0.186+0.266], will increase its market share by up to 18.35% [0.15*(1+0.223)*100].

We are assuming here that there is a linear relation between the proportion of outsourced funds and the market share. However, it appears unreasonable to believe that changes in the proportion of outsourced funds for a management company that already has a large number of funds externally managed will have the same impact on market share as an equivalent change for a management company that has a lower proportion of external funds. To test this non-linear relation, we split *Ratio Outsourced Funds* into three different variables to account for changes in the low, middle and high levels. We therefore estimate the following specification:

$$\log(Market\ Share)_{i,t} = \beta_0 + \beta_1 Low\ Ratio_{i,t-1} + \beta_2 Mid\ Ratio_{i,t-1} + \beta_3 High\ Ratio_{i,t-1} + \beta_4 Market\ Share_{i,t-1} + \beta_5 X_{i,t-1} + u_{i,t} \quad [8]$$

where $Low\ Ratio_{i,t-1}$ considers changes in the proportion of outsourced funds with a structure of less than 20%, measured as the min(Ratio Outsourced Funds, 0.2); and $High\ Ratio_{i,t-1}$ considers only changes for firms that had at least 80% of outsourced funds, measured with the max(0.8, Ratio Outsourced Funds). Finally, we also include $Mid\ Ratio_{i,t-1}$, which considers Ratio Outsourced Funds with a minimum of 0.2 and a maximum of 0.8.

Column 5 of Table VII reports the estimates of equation [8] and confirms our hypothesis about the non-linear relation between the proportion of outsourced funds and market share. Low Ratio is positive and statistically significant with a coefficient of 1.8066 and a p-value of 0.04, while Mid Ratio and High Ratio are not statistically significant. To provide an economic interpretation of these results, we need to consider the standard deviation of Low Ratio (0.1025). An increase of one standard deviation from 0.1 to 0.2025 in the proportion of outsourced funds for a fund family with a market share of 15% will lead to a market share of 18.05% [0.15*e $^{(0.1025*1.8066)}$*100], while an equivalent increase in the proportion of funds (0.1025) for a management company that already has more than 20% of funds outsourced would have no impact on the market share.

Table VII: Outsourcing and Market Share: Management Company Level

This table presents results for the system GMM regressions of management company market share on the family outsourcing policy. The sample includes all U.S. management companies from 1996 to 2011. The dependent variable is **log(market share)**, the natural logarithm of the sum of all assets under management by each management company divided by all assets under management in the industry in that period. **Outsourcing Policy** is a dummy variable that equals 1 for management companies that are currently offering at least one sub-advised fund and 0 otherwise. **% Outsourced Funds** is the proportion of sub-advised funds a management company currently holds over all of its funds. **Outsource New Style** is an indicator variable that equals 1 if the management company is outsourcing funds styles different from those it manages in-house. **Ratio Outsourced Funds** is the proportion of outsourced funds over the total funds of the firm. **Low Ratio** is the min(Ratio Outsourced Funds, 0.2), **High Ratio** is the max(0.8, Ratio Outsourced Funds) and **Mid Ratio** is the Ratio Outsourced Funds with a minimum of 0.2 and a maximum of 0.8. **Past Market Share** is the natural logarithm of the prior year market share. **Firm Expenses** are weighted average objective-adjusted expenses computed across all funds in the firm. **Firm Performance** is the objective-adjusted firm gross return. **Funds Started** is the number of funds started by the company in a given period. **Firm Funds** is the logarithm of the number of funds of the firm. **Firm Turnover** is the average objective-adjusted turnover computed across all funds in the company. **Firm Experience** is the natural logarithm of the number of years a management company has been in existence. **Top 5% Performance** is an indicator variable that equals 1 if a family has at least one fund that is performing in the top 5% of all funds under its investment objective. **Herfindhal across Funds** is the sum of the squared fractions of each fund's share in total management company assets**.** All variables are lagged one period. Time dummies are included but not reported, and the constant term has been omitted. P-values are reported in parentheses, using robust standard errors. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Log (Market Share)				
	(1)	(2)	(3)	(4)	(5)
Outsourcing Policy	0.2532**		0.1008*		
	(0.02)		(0.07)		
Outsource New Style		0.1555**	0.1409**		
		(0.03)	(0.04)		
Ratio Outsourced Funds				0.7570***	
				(0.00)	
Low Ratio					1.8066**
					(0.04)
Mid Ratio					0.0879
					(0.82)
High Ratio					0.5135
					(0.85)
Past Market Share	0.1253**	0.1263**	0.1227**	0.1261**	0.1256**
	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
Firm Expenses	-0.0221	-0.0225	-0.0223	-0.0226	-0.0224
	(0.55)	(0.54)	(0.54)	(0.54)	(0.54)
Firm Performance	0.0007	0.0007	0.0007	0.0007	0.0007
	(0.25)	(0.25)	(0.25)	(0.25)	(0.25)
Funds Started	-0.0122	-0.0126	-0.0127	-0.0124	-0.0125
	(0.20)	(0.19)	(0.19)	(0.20)	(0.19)
Firm Funds	0.1232*	0.1276*	0.1250*	0.1118	0.1156*
	(0.09)	(0.08)	(0.08)	(0.11)	(0.10)
Firm Turnover	0.0583	0.0584	0.0584	0.0578	0.0578
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Firm Experience	2.899***	2.922***	2.909***	2.848***	2.865***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Top 5% Performance	-0.0028	-0.0027	-0.0027	-0.0028	-0.0028
	(0.45)	(0.47)	(0.47)	(0.46)	(0.46)
Herfindahl across Funds	0.0027	0.0025	0.0038	0.0015	0.0026
	(0.97)	(0.97)	(0.96)	(0.98)	(0.97)
Time Dummies	Yes	Yes	Yes	Yes	Yes
Observations	24623	24623	24623	24623	24623

5.2. Investor Sophistication and Outsourcing

Given the positive impact of cobranding, multi-manager and performance fee arrangements, one might wonder why every sub-advising contract under a conflict of interest does not engage in them. To sign an outsourcing agreement with these types of mechanisms implies effort and costs as noted by Balakrishnan and Wernerfelt (1986) for general contracts. It is necessary to find, for example, a family interested in managing your funds, but if it is large and prestigious enough and you are not, it may not agree to collaborate with you. Additionally, if you want to implement the multi-manager mechanism, searching for different management companies takes time and costs beyond signing the subcontracting agreements. We hypothesize that one would be willing to incur such costs only if the investor is sensitive to changes in performance, in the sense that he or she is willing to leave funds if the performance is not as desired.

In this sense, as prior literature has showed, not all fund shareholders are equally informed and sophisticated. For instance, Sirri and Tufano (1998) show that fund flows depend asymmetrically on past returns, chasing top funds while not running away from poorly performing funds. Similar results are found in Ferreira et al. (2012). Additionally, these authors show that sophisticated investors (those more frequently to be selling poor performing funds while buying past winners) are more likely to be placed in developed countries. At the same time, Del Guercio et al. (2010, 2014) evidence that portfolio managers are placed in different channels of distribution depending on the investors' sophistication and the manager's skills. In this regard, we claim that outsourced funds using mechanisms are going to be oriented toward more sophisticated investors, while the remaining outsourced funds with a conflict of interest are going to be written without any mechanism and will be distributed through brokers selling to less informed investors.

To measure investors' sophistication, we follow Sirri and Tufano (1998) by using a piecewise-linear specification to examine different flow-performance sensitivities at different levels of fund returns. In each month and for each investment objective, we rank the funds from 0 to 1 based on their past year gross return, 1 being the top performer and 0 being the worst. The variables on these piecewise decompositions

represent the marginal fund-flow response to performance. Following previous literature, we classify the fractional ranks into three unequal groups. The bottom group (*LowRank*) is the lowest quintile defined as Min(0.2, Rank). The middle three quintiles are combined into one group (*MidRank*) defined as Min(0.6, Rank-LowRank) and the highest quintile (*HighRank*) is defined as Rank-(LowRank+MidRank). We proceed with monthly-pooled OLS regressions to estimate the following piecewise linear regressions:[27]

$$\begin{aligned} Flows_{j,t} = {} & \beta_1 LowRank_{j,t-1} \\ & + \beta_2 Mechanism_{j,t-1} + \beta_3 LowRank_{j,t-1} \\ & * Mechanism_{j,t-1} + \beta_4 MidRank_{j,t-1} + \beta_5 MidRank_{j,t-1} \\ & * Mechanism_{j,t-1} + \beta_6 HighRank_{j,t-1} + \beta_7 HighRank_{j,t-1} \\ & * Mechanism_{j,t-1} + \beta_8 X_{j,t-1} + u_{j,t} \end{aligned} \quad [9]$$

Table VIII provides the results from estimating different specifications of equation [9]. In general, we find flows in the middle and high ranks are more sensitive to performance, consistent with previous literature. The results from columns 2 to 5 confirm that flows from sub-advised funds using mechanisms are more sensitive to poor performance (the coefficient in columns 2 through 5 being positive and statistically significant). This result is consistent with our hypothesis that mechanisms are only employed for mutual funds with sophisticated investors (those who sell poorly performing funds). Regarding the coefficients of the control variables, we find that larger and more expensive funds receive less flow, consistent with Chevalier and Ellison (1997) and Sirri and Tufano (1998).

Prior literature suggests that not chasing winners but selling losers is a "sophisticated" behavior, as it has been proved that performance persists for poor performers but not for top performers. Thus, consistent with our beliefs, sub-advised funds with mechanisms are targeted toward more sophisticated investors than those outsourced funds that are not using any mechanism to prevent the negative effects of potential conflicts of interest.

[27] These results are also robust using a Fama-MacBeth approach.

Table VIII: Flow-Performance Sensitivity: Sub-advised Funds

This table presents results for the regressions of the growth rate of net new money on fund return ranks. The dependent variable is Fund Flows: the percentage of net new inflows into the fund over the previous year. The independent variables based on fund returns are estimated using a piecewise linear regression framework to define three linear segments in the flow-performance sensitivity. Each month, by fund investment objective, we rank the funds from 0 to 1 based on their past year gross return. Then, we construct the ranking variables as LowRank=min(0.2, rank), MidRank=min(0.6, rank-LowRank) and HighRank=rank-(LowRank+MidRank). **Mechanism** is a dummy variable equal to 1 if the fund is sub-advised using either co-branding, multi-manager or performance fee arrangements and 0 otherwise. **Fund Size** is the natural logarithm of TNA under management in millions of dollars. **Family Size** is the logarithm of TNA for all funds in the family, excluding the fund itself. **Expenses** are the total annual expenses and fees divided by year-end TNA. **StD Monthly Returns** is the standard deviation of the prior year's monthly returns. Control variables are lagged 1 period. Time and Investment Style dummies are included but not reported, and the constant term has been omitted. T-statistics are reported in parentheses and standard errors are clustered at fund level. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level. The Wald Test is also performed: HighRank=LowRank (p-value:0.00), HighRank=MidRank (p-value:0.00), and MidRank=LowRank (p-value:0.00).

	Fund Flows				
	(1)	(2)	(3)	(4)	(5)
Low Rank	-0.2121	-0.2099	-0.2099	-0.2138	-0.2105
	(-1.29)	(-1.28)	(-1.28)	(-1.30)	(-1.28)
Mid Rank	0.0687**	0.0684**	0.0684**	0.0689**	0.0686**
	(2.21)	(2.21)	(2.21)	(2.22)	(2.21)
High Rank	0.3098**	0.3066*	0.3061*	0.3089**	0.3078**
	(1.97)	(1.95)	(1.95)	(1.97)	(1.96)
Fund Size	-0.2280***	-0.2281***	-0.2280***	-0.2280***	-0.2281***
	(-16.38)	(-16.38)	(-16.38)	(-16.38)	(-16.38)
Family Size	0.0283***	0.0284***	0.0283***	0.0283***	0.0284***
	(5.15)	(5.15)	(5.15)	(5.15)	(5.15)
Expenses	-0.3011***	-0.3005***	-0.3005***	-0.3007***	-0.3005***
	(-8.57)	(-8.55)	(-8.56)	(-8.56)	(-8.55)
StD Monthly Returns	0.0190	0.0191	0.0190	0.0189	0.0191
	(1.44)	(1.44)	(1.44)	(1.43)	(1.44)
Mechanism		-0.0964	-0.0637	-0.0322	-0.0975**
		(-1.57)	(-1.28)	(-0.65)	(-2.00)
Low Rank*Mechanism		1.0182**			1.3523*
		(2.48)			(1.96)
Mid Rank*Mechanism			0.3182**		-0.1790
			(2.35)		(-0.77)
High Rank*Mechanism				0.6831	-0.1635
				(1.15)	(-0.25)
Style & Time Dummies	Yes	Yes	Yes	Yes	Yes
Observations	346481	346481	346481	346481	346481
Adjusted R^2	0.029	0.030	0.030	0.030	0.032

To be more robust with prior results, we also examine whether outsourced funds with conflicts that do not use any mechanisms are going to be distributed through brokers looking for a less informed type of investor or through a direct channel instead (based

on DelGercio et al.'s (2010, 2013) findings about investor sophistication and channels of distribution). In Table IX, we estimate the following monthly logistic model:

$$\text{Prob}(y_{i,t} = 1) = \frac{\exp(\beta_j z_i)}{1+\exp(\beta_j z_i)} \quad [13]$$

where $\beta_j z_i$ is $(\beta_0 + \beta_1 \text{Conflicted}_{i,t-1} + \beta_2 \text{Conflicted}_{i,t-1} * \text{Indirect Channel}_{i,t-1} + \beta_3 \text{Indirect Channel}_{i,t-1} + \beta_4 x_{i,t-1} + \varepsilon_{it})$. The dependent variable $(y_{i,t})$ is a dummy variable that equals 1 if the outsourced fund used Co-branding, Multi-advising, or Performance-fee arrangements. $\text{Conflict}_{i,t-1}$ is a dummy variable that equals 1 if the fund has been outsourced to a sub-advisor that is also managing and distributing its own funds. $\text{Indirect Channel}_{i,t-1}$ is a dummy variable that equals 1 if the fund is charging any load fee, as a proxy for broker distribution and 0 otherwise (direct channel).[28]

The estimated value of Conflict is positive and statistically significant at 1% across the different models of Table IX. This suggests that these contractual arrangements are primarily applied to outsourced funds with a potential conflict of interest. However, we show that this positive probability is reduced when the funds are sold indirectly. The coefficient of the interaction β_2 is negative and statistically significant (except for the performance fee), consistent with our third hypothesis that management companies use indirect channels of distribution as an alternative to using costly mechanisms to protect fund performance. The performance fee appears to be used for distribution through direct channels independent of whether or not the fund is managed externally by firms that also manage their own funds. To offer an economic interpretation of these results, we will focus on the general mechanism (Column 4), which has an unconditional probability of 6.7%. Funds under potential conflicts of interest that are sold indirectly through brokers are 26.9% (0.0180/0.067) less likely to be under a mechanism than other similar funds.

[28] Prior literature (e.g., Bergstresser et al. (2009)) has shown that investors generally do not pay front-end or back-end loads when purchasing mutual funds through a direct channel. Massa et al. (2010) also used load funds as a proxy for funds distributed through indirect channels.

Table IX: Distribution Channel and the Use of Mechanisms

In this table, we use fund loads as a proxy for indirect channel distribution, assuming that those funds that charge loads are distributed by a broker and those without loads are distributed by direct channels. This table reports the results of monthly logistic regression estimates of whether a sub-advised mutual fund uses mechanisms depending on the type of distribution channel and other fund and family characteristics. The sample contains U.S. mutual funds from 1996 to 2011. The dependent variables are dummies equal to 1 if the fund is outsourced and uses co-branding, multi-manager, and/or performance fee arrangements (Mechanism). **Indirect Channel** is a dummy variable that equals 1 if the fund charges any load fee as a proxy for indirect distribution. The iteration term **Conflict*Indirect Channel** is also included to examine the effect of using this distribution channel over sub-advised funds with potential conflicts of interest. The remaining variables are a set of controls previously described. Time and investment-style dummies are included but not reported; t-statistics are reported in parentheses, and the constant term has been omitted. Average marginal effects and standard deviations are also shown, and the unconditional probability is described as the baseline predicted probability. Standard errors are clustered at the fund level. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Co-branding		Multi-advising		Performance-fee		Mechanism	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
Conflict*Indirect Channel	-0.5184*	-0.0077*	-0.4365*	-0.0092*	0.3270	0.0014	-0.4641**	-0.0180**
	(-1.78)	0.1411	(-1.91)	0.1411	(0.69)	0.1411	(-2.44)	0.1411
Conflict	2.0754***	0.0309***	2.8628***	0.0605***	2.1660***	0.0090***	2.8495***	0.1107***
	(13.76)	0.2729	(25.01)	0.2729	(9.91)	0.2729	(28.75)	0.2729
Indirect Channel	0.1968	0.0029	0.1354	0.0029	-1.3598***	-0.0057***	-0.0449	-0.0017
	(1.09)	0.3975	(0.81)	0.3975	(-3.89)	0.3975	(-0.34)	0.3975
Fund Size (log TNA)	-0.0102	-0.0002	0.0595	0.0013	-0.0320	-0.0001	0.0257	0.0010
	(-0.28)	2.0416	(1.64)	2.0416	(-0.49)	2.0416	(0.95)	2.0416
Family Size (log family TNA)	-0.1712***	-0.0025***	0.1874***	0.0040***	-0.1507*	-0.0006*	0.1044***	0.0041***
	(-3.09)	2.6454	(4.36)	2.6454	(-1.95)	2.6454	(2.97)	2.6454
Family Funds	0.3006**	0.0045**	-0.5357***	-0.0113***	0.5738***	0.0024***	-0.2902***	-0.0113***
	(2.21)	1.2380	(-5.84)	1.2380	(3.76)	1.2380	(-3.74)	1.2380
Fund Age	-0.3971***	-0.0059***	-0.1178	-0.0025	-0.5341**	-0.0022**	-0.2370***	-0.0092***
	(-2.92)	0.6096	(-1.15)	0.6096	(-2.31)	0.6096	(-2.82)	0.6096
Distribution Fee	-0.0184	-0.0003	-0.3389	-0.0072	-3.1089***	-0.0130***	-0.5337***	-0.0207***
	(-0.08)	0.3243	(-1.64)	0.3243	(-4.78)	0.3243	(-3.09)	0.3243
Expenses	0.3030**	0.0045**	0.2690**	0.0057**	0.3079	0.0013	0.3280***	0.0127***
	(2.53)	0.5560	(2.32)	0.5560	(1.38)	0.5560	(3.56)	0.5560
Turnover	-0.0330	-0.0005	-0.0008	-0.0000	-0.0017	-0.0000	-0.0126	-0.0005
	(-1.17)	2.0294	(-0.05)	2.0294	(-0.06)	2.0294	(-0.77)	2.0294
Flows	0.0026	0.0000	-0.0126	-0.0003	-0.0528	-0.0002	-0.0123	-0.0005
	(0.37)	2.4956	(-0.86)	2.4956	(-0.74)	2.4956	(-1.25)	2.4956
Past Returns	0.0045*	0.0001*	-0.0004	-0.0000	-0.0042*	-0.0000*	0.0001	0.0000
	(1.80)	18.6508	(-0.19)	18.6508	(-1.76)	18.6508	(0.07)	18.6508
Style & Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	346481	346481	346481	346481	346481	346481	346481	346481
Baseline Predicted Probability	0.024		0.041		0.011		0.067	
Pseudo R^2	0.121		0.215		0.170		0.211	

6. Alternative Interpretations and Robustness Checks

In the previous sections, we have shown the importance of choosing different contractual arrangements when writing outsourcing contracts and the positive impact from these clauses on fund performance. We have also shown the positive relation between these contracts and the market share of management companies. As with any empirical study, an important concern in the interpretation of our results is potential endogeneity issues. In the following sections, we will try to address this concern while considering different alternative interpretations.

6.1 The Effect of Bargaining Power

In prior sections, we have shown that contractual arrangements such as co-branding, multi-advising and performance fees are associated with an increase in the performance of outsourced funds managed by external firms that also manage their own funds. We pointed out that this result is related to the incentive alignment created by implementing these arrangements. However, one might argue an alternative interpretation: top sub-advisors may agree to these contracts because they can perform very well with low effort and either achieve higher compensation through performance fees or advertise themselves through the co-branding contract.

To address this concern and confirm that writing these contracts actually encourages extra effort from sub-advisors, we need to proceed with a two-stage residual inclusion (2SRI) approach. We need to find a variable that is highly correlated with the use of these contractual arrangements and estimate the probability of using them in a 1st Stage using a logistic model. Then, we include the residual from the logistic model into the 2nd Stage regression to examine the effect of these contracts on fund performance. We expect that the decision of whether to include a mechanism will depend on the bargaining power of the advisor. When the sub-advisor's revenue is highly (less) dependent on a single firm, then the sub-advisor will have less (more) bargaining power, and thus it will be more (less) willing to accept the advisor's contract clauses. Table X (Panel A) reports the estimates for the following logistic regression:

$$\text{Prob}(y_{i,t} = 1) = \frac{\exp(\beta_f z_i)}{1+\exp(\beta_f z_i)} \quad [14]$$

where $\beta_f z_i = (a_0 + a_1 Sub\_Advisor\ Revenue\ Dependence_{j,t-1} + a_2 X_{i,t-1} + \delta_t + T_t + ei,t$. The dependent variable (yi, t) is a dummy variable equal to 1 if the fund is sub-advised using either co-branding, multi-manager or performance fee arrangements and 0 otherwise. $Sub\_Advisor\ Revenue\ Dependence_{j,t-1}$ is the main explanatory variable proxying for the advisor's bargaining power. $X_{i,t-1}$ is a vector of fund and family variables lagged one period. We include style dummies (δ_t) and time dummies (T_t) and cluster the standard errors at the fund level.

In Panel A, our bargaining power variable *Sub-advisor revenues dependence* measures the proportion of the sub-advisor's income (TNA internal funds times expense ratio plus TNA external funds times advisory fee) that comes from the management companies affiliated with the sub-advised funds. The coefficient is positive and statistically significant, with a marginal effect coefficient of 6.11%, suggesting that higher levels of advisor bargaining power leads to higher probabilities of contractual arrangements.

In Panel B, we present the results for the second stage of the 2SRI estimation of the effect on fund performance from outsourcing under these mechanisms estimated using a Fama-MacBeth approach.[29] We replicate the estimation of equation [1] with the only difference being the inclusion of the residual from the logistic estimation of Panel A. The coefficient of the residual is statistically significant, confirming the concerns regarding endogeneity issues, and contrary to our expectation, the negative sign of the Residual 1st Stage suggests that top performing sub-advisors are more likely to avoid writing these contractual arrangements. A possible explanation might be that management companies trust sub-advisors that deliver good performance and do not require them to write such clauses. Nevertheless, the main results remain unchanged, and we can confirm that outsourcing contracts that include a contractual agreement aligning the principal's (advisor) and the agent's (sub-advisor) incentives will have a positive impact on final fund performance.

[29] These results are also robust when using an OLS methodology. They are available upon request.

Table X: The Use of Mechanisms 2SRI: The Effect of Bargaining Power on Sub-advising Decisions with Mechanisms and the Effect of Sub-advising with Mechanisms on Fund Performance

Panel A presents the monthly logistic regressions in the 1ST-stage regression of the 2SRI estimation of the effect of sub-advisory agreements with mechanisms on mutual fund performance. This specification measures the effect of advisor bargaining power on the use of mechanisms when arranging sub-advisory agreements. The dependent variable is a dummy variable equal to 1 if the fund is sub-advised using co-branding, multi-manager or performance fee arrangements and 0 otherwise. **Sub-advisor Revenues Dependence** measures the proportion of the sub-advisor's income (TNA internal funds times expense ratio plus TNA external funds times advisory fee) that comes from the management companies affiliated with the sub-advised funds. Panel B shows the 2nd-stage estimation of the effect of sub-advising with mechanisms on fund performance under a Fama-MacBeth (1973) approach. The dependent variable is fund performance measured by Carhart's model augmented by an international index (5F) and a global bond index (6F) and Carhart's model augmented by 3 government bond indexes and 2 corporate indexes (9F). **Residual 1ST Stage** is the residual from the 1st stage logistic regression of the 2SRI estimation. The remaining variables have been previously described. The sample includes all U.S. mutual funds from 1996 to 2011. Time and Style dummies are included but not reported, and the constant term has been omitted. The t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987)). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level. The baseline predicted probability of Panel A is 0.048.

	Panel A: (*1st Stage*) – The Use of Mechanism		*Panel B*: (*2nd Stage*) – Fund Performance		
	Coef/t	Mfx/Sd	ALPHA 5F	ALPHA 6F	ALPHA 9F
Sub-advisor Revenues Dependence	1.5733***	0.0611***			
	(7.48)	0.2064			
Conflict*Mechanism			0.1066***	0.1027***	0.0951***
			(3.68)	(3.55)	(3.04)
Conflict			-0.0948***	-0.0957***	-0.0921***
			(-5.33)	(-5.83)	(-5.14)
Mechanism			0.7627***	0.7173***	0.9127***
			(3.68)	(3.45)	(3.91)
Fund Size (log TNA)	-0.0343	-0.0013	0.0008	0.0006	-0.0039
	(-1.10)	1.9932	(0.38)	(0.30)	(-1.29)
Family Size (log family TNA)	0.0980**	0.0038**	0.0166***	0.0120***	0.0193***
	(2.26)	2.3329	(5.98)	(3.87)	(4.42)
Family Funds	-0.1902**	-0.0074**	-0.0100*	-0.0096*	-0.0031
	(-2.29)	1.1381	(-1.94)	(-1.85)	(-0.51)
Fund Age	-0.5144***	-0.0200***	0.0222***	0.0336***	0.0505***
	(-4.52)	0.5381	(3.10)	(4.94)	(5.42)
Distribution Fee	-0.6906***	-0.0268***	-0.1012***	-0.0996***	-0.1627***
	(-3.88)	0.3271	(-6.17)	(-6.13)	(-6.04)
Expenses	0.5557***	0.0216***	0.0789***	0.0908***	0.1383***
	(5.96)	0.5322	(4.53)	(5.42)	(5.32)
Turnover	-0.0127	-0.0005	-0.0037	-0.0001	-0.0032
	(-0.86)	1.9308	(-1.21)	(-0.04)	(-0.68)
Flows	-0.0066	-0.0003	0.0253***	0.0320***	0.0389***
	(-0.56)	1.9426	(4.59)	(5.93)	(5.29)
Past Returns	-0.0126*	-0.0005*	0.0185***	0.0136***	0.0187***
	(-1.94)	5.0886	(8.95)	(7.76)	(8.42)
Residual 1st Stage			-0.7464***	-0.6881***	-0.9011***
			(-3.59)	(-3.26)	(-3.81)
Style Dummies	Yes	Yes	Yes	Yes	Yes
Time Dummies	Yes	Yes	No	No	No
Observations	346481	346481	346481	346481	346481
Pseudo R^2	0.052		0.197	0.109	0.111

6.2 Creating New Styles Using In-house Managed Funds

The investment management industry is dynamic in nature; new investment categories arise, and there is considerable variation in investor preferences over time. If a management company wants to maximize its profits, it needs to maintain its current investors while continuing to attract new investors to gain market share in the industry. Therefore, a management company might offer a new fund that differs from its existing product line to capture new investors. This is in line with Mamaysky and Spiegel (2002), who claim that the investment characteristics of new funds should differ as much as possible from those of existing funds.

We have previously shown that fund families that have an outsourcing policy can gain greater market share, especially when they launch funds with new investment objectives. Because these companies find their expertise regularly extended by investor demands for investment opportunities that are not within the fund family core competency, outsourcing provides a way for the management company to meet these demands. However, one might argue that investors respond more favorably towards families that offer a differentiated product independently of whether the funds are managed in-house or outsourced.

To test this idea, in Table XI (Panel B), we estimate the following system GMM regression models:

$$\log(Market\ Share)_{i,t} = \beta_0 + \beta_1 New\ Style_{i,t-1} + \beta_2 X_{i,t-1} + u_{i,t} \quad [15]$$

$$\log(Market\ Share)_{i,t} = \beta_0 + \beta_1 New\ Style_{i,t-1} + \beta_2 Inhouse\ New\ Style_{i,t-1} + \beta_3 Outsource\ New\ Style_{i,t-1} + \beta_4 X_{i,t-1} + u_{i,t} \quad [16]$$

where $New\ Style_{i,t-1}$ equals 1 if in the previous month, management company *i* created a fund in a different investment category than its existing funds. If this new fund is managed internally, $Inhouse\ New\ Style_{i,t-1}$ will be 1; however, if this fund is outsourced to an unaffiliated sub-advisor, $Outsource\ New\ Style_{i,t-1}$ will be 1 instead. We also control for

a set of family characteristics $X_{i,t-1}$, previously described, where we include $Market\ Share_{i,t-1}$, which is the market share of family "i" in period t-1.

β_1 of equation [15] is positive and statistically significant (coefficient: 0.1206, p-value: 0.05). In economic terms, a family with 15% of market share that creates a new style fund would increase its market share to 16.9% [0.15*e $^{(0.1206)}$*100]. Therefore, families that innovate more than the competition are able to attract a larger share of the market, and consistent with prior literature, differentiating the new product from existing ones is therefore an important consideration (see, e.g., Tirole (2004)).

Next, we are interested in analyzing whether internal versus external management of new funds affects the market share of the firm. Estimates of equation [16] exhibit a positive coefficient for β_2 and β_3, whereas only the estimate of $Outsource\ New\ Style_{i,t-1}$ is statistically significant at the 5% level. Thus, we could argue that creating a new fund style leads to greater market share when the new fund is externally managed by a firm that, we assume, has greater expertise in that investment category.

Alternatively, if we control for management company expertise, we would expect that offering a new investment category fund will contribute to an increase in market share independently of whether the fund is managed in-house or outsourced. Therefore, we are concerned about a sample selection bias in which management companies decide to externalize all new funds unless they have a management structure that allows them to manage such new funds in-house. To test for this alternative interpretation, we employ Heckman's approach, which uses the inverse Mill's ratio (obtained from a probit model that estimates the probability of managing a new fund in-house) as an additional control in our market share model (see, e.g., Heckman, 1978).

In Panel A of Table XI, we estimate the probability of internally managing a fund created in a new investment category using *Herfindhal In-house Styles* (the sum of the squared fractions of each investment objective's share in the total management company assets of in-house managed funds) and the family control variables previously used. As we expect, the coefficient of *Herfindhal In-house Styles* is negative and statistically significant,

suggesting that families with a more concentrated internal management structure are less likely to manage a new fund category in-house. In a second stage, we replicate the estimation of equation [16] including the *Inverse Mill's Ratio.* The coefficient estimate for the Mill's ratio provides insight into the relation between the omitted variable and market share. A positive and statistically significant estimate of the coefficient of the Inverse Mill's Ratio in the third column of Panel B indicates that management companies with greater market share are more likely to manage new funds in-house.

The endogeneity-corrected estimates of equation [16] suggest that when considering the internal management structure of a fund family, both the internal and the external management of new investment categories has a positive effect on the management company's market share (β_2 and β_3 are positive and statistically significant at 10%). The meaningful differences between the column 2 and 3 estimates of the coefficient of $Inhouse\ New\ Style_{i,t-1}$ suggest that, consistent with our intuition, self-selection has an economically meaningful impact when interpreting the effect of product differentiation and outsourcing on market share. We can conclude that outsourcing allows fund families to gain much greater market share when externalizing funds in a new investment category, unless the family already has a well-diversified internal management structure. In this case, the increase in market share will come from the mere fact of creating a new style rather than the outsourcing decision, as in-house management will make a contribution similar to that of external management.

Table XI: New Styles and Market Share: Selection Bias Approach

Table XI presents the monthly regressions with and without applying a selection bias approach to the effect of managing (either in-house or sub-advised) new investment styles on fund family market share. The sample includes all U.S. management companies from 1996 to 2011. The dependent variable in Panel A is **In-house New Style**, a dummy variable that equals 1 for management companies that are currently offering a new investment style that is managed in-house. **Herfindhal In-house Styles** is the sum of the squared fractions of each investment objective's share in total management company assets of in-house managed funds**.** In Panel B, we report the estimates of system GMM regressions where the dependent variable is **log(market share)**, the natural logarithm of the sum of all assets under management by each management company divided by all assets under management in the industry in that period. **New Style** is a dummy variable that equals 1 for management companies that are currently offering a new investment style that is managed either in-house or outsourced. **Inverse Mill's Ratio** has been estimated from the Probit model of Panel A (Heckman Correction approach). The remaining variables have been previously described in Table VII. Time dummies are included but not reported, and the constant term has been omitted. P-values are reported in parentheses using robust standard errors. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level. The baseline predicted probability of Panel A is 0.593.

	Panel A: *Prob (In-house New Style)*		*Panel B*: *Log(Market Share)*		
	Coef/p-value	Mfx/Std	Coef/p-value	Coef/p-value	Coef/p-value
Herfindahl In-house Styles	-0.127***	-0.047***			
	(0.00)	0.311			
New Style			0.1206**	0.0275	-0.0596
			(0.05)	(0.74)	(0.33)
In-house New Style				0.0490	0.1063*
				(0.49)	(0.06)
Outsource New Style				0.1260**	0.1011*
				(0.03)	(0.07)
Firm Expenses	0.054***	0.020***	-0.0008	-0.0011	-0.0070
	(0.00)	0.549	(0.98)	(0.98)	(0.86)
Firm Performance	-0.006	-0.002	0.0006	0.0006	-0.0012
	(0.19)	2.028	(0.42)	(0.42)	(0.22)
Funds Started	-0.016***	-0.006***	-0.0116	-0.0116	-0.0097
	(0.00)	2.077	(0.19)	(0.18)	(0.20)
Firm Funds	0.675***	0.251***	0.1464*	0.1417*	0.3700**
	(0.00)	1.342	(0.07)	(0.08)	(0.02)
Firm Turnover	-0.005	-0.002	0.0645*	0.0642*	0.0605
	(0.40)	1.563	(0.07)	(0.08)	(0.10)
Firm Experience	0.021**	0.008**	2.9879***	2.9648***	2.8806***
	(0.05)	0.810	(0.00)	(0.00)	(0.00)
Top 5% Performance	0.065***	0.024***	-0.0039	-0.0038	0.0132
	(0.00)	0.499	(0.30)	(0.31)	(0.11)
Herfindahl across Funds	-0.633***	-0.236***	-0.0003	0.0006	-0.1728
	(0.00)	0.320	(1.00)	(0.99)	(0.20)
Past Market Share			0.1853***	0.1849***	0.1192**
			(0.00)	(0.00)	(0.04)
Inverse Mill's Ratio					0.5190**
					(0.05)
Time Dummies	Yes		Yes	Yes	Yes
Observations	24623		24623	24623	24623
Pseudo R^2	0.364				

7. Conclusions

Our analysis of the growth of sub-advising within the investment funds industry over the last decade, shows that outsourcing contracts allow management companies to gain market share in an increasingly competitive industry. Contrary to findings elsewhere, we document that outsourced funds underperform only when investors are uninformed. When the investor demands good management, we show that the market actually provides several effective contractual arrangements for monitoring sub-advisors. Therefore, by offering each client what it demands, fund families can benefit from outsourcing to improve their market share.

Our findings indicate that an incentive fee mechanism and different types of sub-advisory agreements – such as multi-manager contracts and co-branding business models – are responsible for a positive impact to fund performance that ranges from 0.60% to 0.76% per year (risk-adjusted return). There are a variety of theories that explain the positive results of these contractual arrangements.

First, Klein and Leffler (1981) document that reputation effects constitute implicit protection against adverse selection, so co-branding an outsourcing contract can help to align incentives because the fund's performance will be linked to the sub-advisor's reputation. Second, Kandel and Lazear (1992) suggest that profit sharing can generate mutual monitoring and peer pressure while positively affecting firm productivity. A multi-advising contract, which involves compensation shared by all firms in the contract, leads sub-advisors to monitor each other. Finally, Holmstrom (1979) finds that performance-based contracts solve moral hazard or adverse selection problems; that is, when sub-advisors are compensated under a fulcrum fee structure, the management company (principal) will be able to extract higher yield from the outsourcing contract.

We document that management companies with an outsourcing policy gain greater market share than those that manage all their funds in-house. We see this particularly when the firm outsources funds with an investment style that differs from those managed in-house. We also show that the increase in market share for a management company with a well-

diversified internal management structure stems from creating a new style, as the contribution of in-house management is similar to that of external management. Outsourcing is especially useful to firms offering new funds in areas where they lack expertise.

SUPPLEMENTARY APPENDIX

This appendix provides details on how we proceeded matching the different databases, results from testing several alternative interpretations, and robustness checks.

1. Technical Appendix: Jaccard Similarity for a Fuzzy Match

Also known as the Jaccard Index, the Jaccard similarity coefficient is a statistical measure of similarity between sample sets; for two sets, it is defined as the cardinality of their intersection divided by the cardinality of their union. For example, the sets {a, b, c} and {a, c, d} have a Jaccard similarity of 2/4=0.5 because the cardinality of their intersection is 2 {a, c} and that of their union is 4 {a, b, c, d}. The maximum obtainable index is one, in which case the sets are identical; therefore, the higher the index is, the greater the similarity between the sets.

A more sophisticated way to proceed with this algorithm is to use the Weighted Jaccard Index, which enables us to assign weights to each item in a set and define the weighted Jaccard similarity index as the total weight of the intersection divided by the total weight of the union. Imagine the previous example with the following weights: {(a, 25), (b, 35), (c, 13)}, {(a, 25), (c, 13), (d, 27)}. The weighted Jaccard similarity is then (25+ 13)/(25 +35 + 13 +27) = 38/100 = .38.

Because Jaccard similarity is defined over sets, our fuzzy match algorithm must convert data records to sets before calculating the Jaccard similarity. We can convert the data into sets of words, using spaces to separate the sets (trust and fund name). For example, the record {“Pacific Select Fund”, “Fidelity Series”} will be structured into the set {“Pacific”, “Select”, “Fund”, “Fidelity”, “Series”}. Then, a weight is assigned to each word because not all the words are of equal importance. Words are assigned high weights if they occur infrequently in a sample of records and low weights if they occur frequently. For example, frequent words, such as “Fund,” might be given a low weight, whereas less frequent words, such as “Vanguard,” might be given a high weight. We also include some words that were repeated in the sample but were considered to be of high importance and so were manually assigned high weights.

Finally, transforming the sample can greatly increase the power of the Jaccard Index. For example, if we allow for an abbreviation such as "U.S." to represent "U.S.A.," "EEUU" or "United States", we obtain better results. This also occurs with misspelled words. For example, "Fidelity" is not a different word from "Pidelity" but a typographic error made by the register. Therefore, Weighted Jaccard Index similarity under transformation is the maximum weighted Jaccard similarity across all pairs of transformed sets. Thus, fuzzy match and Jaccard similarity are used together to find the pair of inputs with the highest Jaccard Index. We proceeded with a fuzzy match as follows:

1) The name of the fund in CRSP is written as "trust name: fund name, class". Once we aggregate the class level information to the fund level, we eliminate the class; thus, we have, for each observation, the trust name and the fund name. We collect identical information for each observation in the NSAR database (trust and fund name).
2) When we have trust and fund names in both databases, we conduct a fuzzy match by names using weighted Jaccard similarity (the details of this process are provided above).
3) For each pair of trust and fund names in both databases, we have an index from 0 to 1, which indicates the degree of similarity between the two. We first drop all outputs with index values below 0.5 and directly accept as valid outputs with index values of 1.
4) For outputs between 0.5 to 0.85, we double-check them manually, assigning 0 to those belonging to different funds and 1 to those identified as identical. We again drop those with values of 0 and accept those with values of 1.
5) If the output is between 0.85 to 1, we undertake another filtering process. We extract "key words" pertaining to investment style such as "equity", "bond", "small", "cap", etc., and all possible combinations among them. Both outputs must exactly coincide with these words. Thus, at this point, the fund names have a Jaccard similarity above 0.85 and, additionally, are characterized by the same investment style. Those that differ in investment style are dropped from the sample.

To ensure the accuracy of the process, we then manually double-check a random set of matches representing 5% of the final dataset.

2. Summary Statistic: Management Companies

Table IA.1 provides by year the same information as Table I but now considering the management companies (MCs) in our sample instead of the funds. The number of firms has grown from 315 in 1996 to more than 500 in the last few years. The second column (sub-advised MC) reports the number of these companies that have entered into sub-advisory agreements. Thus, families with an outsourcing policy (with at least one sub-advised fund) have increased considerably, from 88 to 161. Among these families, we observe that a high proportion tend to outsource their portfolios to sub-advisors that also have their own funds. For example, by 2011, more than 2/3 of these firms had at least one fund under a conflict of interest. From this table, we can conclude that outsourcing may be a relevant decision at the family level because we observe that not every family employs outsourcing in its fund management; approximately 50% of the families in our sample never employed it.

Table IA.1: Sub-advising Contracts over Time: Management Company (MC) Level

This table reports the number of all management companies and those that have at least one sub-advised fund for the period 1996-2011. For each year, we also report the proportion of these MCs that have entered into one of the different sub-advisory agreements. The *Conflict MC* column contains the percentage of MCs with at least one sub-advised fund in which the sub-advisor is also the principal advisor for its own funds. *Co-branding* refers to MCs that hold at least one fund that uses the sub-advisor's reputation by including the sub-advisor's name in the fund's name. Multi-advising refers to MCs that currently have at least one fund sub-advised by more than one sub-advisor. *Performance Fee MC* applies when the firm has at least one sub-advised fund that charges a floating fee that depends on prior fund performance. The last column, *Mechanism MC*, indicates the proportion of MCs that contain at least one sub-advised fund that use any of the prior contracts (co-branding, multi-advising and/or performance fee).

Year	All MC	Sub-advised MC	Conflict MC	Co-branding MC	Multi-advising MC	Performance fee MC	Mechanism MC
1996	315	88	40.91%	20.45%	13.64%	4.55%	35.23%
1997	338	95	44.21%	16.84%	23.16%	6.32%	38.95%
1998	372	113	39.82%	24.78%	20.35%	4.42%	44.25%
1999	375	109	41.28%	23.85%	22.94%	6.42%	45.87%
2000	570	163	48.47%	19.02%	19.02%	6.75%	40.49%
2001	508	160	54.38%	21.88%	24.38%	5.63%	43.13%
2002	497	161	62.11%	22.36%	32.30%	6.83%	50.31%
2003	488	165	63.03%	17.58%	32.73%	6.06%	46.67%
2004	475	179	61.45%	18.44%	30.73%	6.15%	45.25%

(Continued)

2005	434	158	60.13%	22.78%	34.81%	3.80%	51.27%
2006	426	148	66.22%	25.68%	33.78%	6.76%	50.00%
2007	414	141	59.57%	26.24%	36.17%	8.51%	54.61%
2008	472	139	61.15%	28.06%	40.29%	7.91%	56.83%
2009	511	163	62.58%	34.36%	40.49%	7.98%	61.96%
2010	510	148	58.78%	36.49%	45.95%	6.76%	67.57%
2011	508	161	67.75%	34.23%	38.74%	6.31%	59.46%
Average	451	143	52.25%	24.54%	31.33%	6.38%	49.98%

3. Robustness Checks

3.1 Sub-advised Funds: Potential Conflict of Interest

To test for sub-advised fund efficiency, we estimate differences in performance due to management status from the following monthly Fama-MacBeth (1973) regression of risk-adjusted returns on fund characteristics:

$$Performance_{jt} = \beta_0 + \beta_1 Conflict_{jt-1} + \beta_2 X_{jt-1} + \varepsilon_{jt}, \quad [1]$$

where $Performance_{jt}$ is the alpha of fund j in month t, β_0 is the intercept, $Conflict_{jt-1}$ is a dummy variable indicating whether fund j was sub-advised to a firm that was also managing its own funds in month t, and X_{jt-1} is a set of 1 period lagged control variables. The subscript j corresponds to all U.S. open-end funds in our sample. We also adjust for serial correlation by applying Newey-West (1987) estimates of standard errors with lags of order three.

Table IA.2 reports the estimation results for equation [1]. We include fund-investment-style dummies to avoid concerns about potential correlation between the fund style and fund performance. We cluster standard errors at the fund level. The results show that these outsourced funds underperform funds managed in-house. The coefficient β_1 is negative for all performance measures (-0.0616, -0.0549, -0.0500, -0.0566, -0.0530 and -0.0531 from columns 1 to 6, respectively), which indicates that underperformance ranges from 60 bps per year (using the alpha 4F model) to 73.9 bps per year (using the alpha 1F model). Our

results are consistent with Chen et al. (2013), who find – using a different dataset –that funds outsourced to sub-advisors who also manage their own funds underperform in-house funds by between 50.4 and 72 bps per year.

Table IA.2: In-house Managed vs. Sub-advised Mutual Funds

This table shows the Fama-MacBeth (1973) estimates of monthly risk-adjusted fund returns on fund characteristics. The sample contains all of the U.S. mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance measured by the alpha from CAPM (1F), the Fama-French three factor model (3F), Carhart's 4 factor model (4F), Carhart's model augmented by an international index (5F) and a global bond index (6F) and Carhart's model augmented by 3 government bond indexes and 2 corporate bond indexes (9F). **Conflict** is a dummy variable that equals 1 if the fund is sub-advised by an unaffiliated firm that also manages its own funds and 0 otherwise. **Fund Size** is the natural logarithm of TNA under management in millions of dollars. **Family Size** is the logarithm of TNA for all funds in the family, excluding the fund itself. **Family Funds** indicates the logarithm of the number of funds in the family, excluding the fund itself. **Fund Age** is the logarithm of the number of years since inception. **Distribution Fee** is the ratio of the total assets attributed to marketing and distribution costs. **Expenses** are the total annual expenses and fees divided by year-end TNA. **Turnover** is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. **Flow** is a percentage that represents new inflows into the fund over the previous year. **Past Returns** is a fund's past years' gross risk-adjusted return. Control variables are lagged 1 month. Investment Style dummies are included but not reported, and the constant term has been omitted. The t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987)). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance					
	ALPHA 1F	ALPHA 3F	ALPHA 4F	ALPHA 5F	ALPHA 6F	ALPHA 9F
Conflict	-0.0616***	-0.0549***	-0.0500***	-0.0566***	-0.0530***	-0.0531***
	(-4.56)	(-5.23)	(-4.92)	(-5.32)	(-4.64)	(-4.37)
Fund Size (log TNA)	-0.0046	-0.0056	-0.0066	-0.0084	0.0001	0.0003
	(-1.02)	(-1.04)	(-1.23)	(-1.57)	(0.02)	(0.07)
Family Size (log family TNA)	0.0180***	0.0105***	0.0110***	0.0088***	0.0112***	0.0179***
	(4.61)	(3.14)	(3.51)	(3.02)	(4.32)	(4.39)
Family Funds	-0.0177**	-0.0064	-0.0076	-0.0050	-0.0150***	-0.0143**
	(-2.13)	(-0.94)	(-1.22)	(-0.81)	(-2.90)	(-2.09)
Fund Age	0.0238***	0.0272**	0.0271**	0.0305***	0.0093	0.0123
	(3.31)	(2.51)	(2.42)	(2.97)	(1.04)	(1.33)
Distribution Fee	-0.1006**	-0.0157	-0.0222	-0.0104	-0.0724**	-0.1206***
	(-2.60)	(-0.43)	(-0.62)	(-0.29)	(-2.46)	(-3.50)
Expenses	0.0572	-0.0257	-0.0312	-0.0447	0.0480	0.0989
	(1.32)	(-0.60)	(-0.71)	(-1.04)	(1.44)	(1.57)
Turnover	0.0047	0.0036	0.0041	0.0022	0.0051	0.0134
	(1.19)	(0.79)	(1.19)	(0.68)	(1.39)	(1.63)
Flows	0.0229***	0.0149***	0.0148***	0.0153***	0.0135***	0.0158***
	(4.93)	(3.90)	(3.90)	(3.89)	(3.02)	(2.96)
Past Returns	0.0239***	0.0240***	0.0212***	0.0202***	0.0161***	0.0186***
	(7.45)	(6.48)	(6.11)	(6.00)	(4.88)	(5.54)
Style Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	346481	346481	346481	346481	346481	346481
R^2	0.111	0.117	0.117	0.109	0.086	0.091

3.2 Outsourcing and Market Share: Instrumental Variable Approach

In this section, we employ an instrumental variable approach to document the causal effect of outsourcing decisions on market share. If a fund family is internally managing a group of funds more concentrated around an investment objective, this company will have a more specific internal management structure, and therefore, it will be more likely to make outsourcing decisions. Meanwhile, management companies that are managing a wider variety of investment style funds in-house will have less need to hire an external firm to manage new funds. We propose an instrument to determine whether the management company has an outsourcing policy based on how concentrated their internal management structure is. The instrument is the Herfindhal index across styles of funds managed internally, calculated as the sum of the squared fractions of each investment objective's share in the total management company assets of in-house managed funds.

Table IA.3 presents the results of a 2SRI estimation (previously described) of the effect of the firm sub-advisory policy on the fund family market share. Panel A reports the monthly logistic regressions of the 1st-Stage regression. This first specification measures the effect of the internal concentration of firm managed assets across investment objectives on the outsourcing agreements decisions. Consistent with the conditions of being a good instrument, the variable *Herfindahl In-house Styles* is highly correlated with *Outsourcing Policy*. The coefficient is positive and statistically significant, with a marginal effect of 0.386, suggesting that a one standard deviation increase of internal management concentration (0.311) makes the firm 12% more likely to become involved in outsourcing contracts. Considering that the unconditional probability of having an outsourcing policy is 37.8%, we can conclude that fund families with one higher standard deviation in *Herfindahl In-house Styles* are 31.7% more likely to be an outsourcing firm that other families.

To have a valid instrument, we must assume that the level of concentration in the internal management of a firm is uncorrelated with the firm's market share. We cannot think of any economic reason why both variables would be related. Different scenarios might lead to different results. For example, a family with a concentrated internal management

structure can gain market share if it outsources the portfolio management for funds targeting other investment styles, while they will have a lower market share if they decide to focus only on the specific style of internal funds. Similarly, a firm with a less concentrated internal management structure can gain market share because it is covering the entire market or can lose market share simply because it is not an internal specialist in a few styles.

Panel B of Table IA.3 shows the 2nd-Stage of the 2SRI estimation of the effect of the sub-advising policy on firm market share. We replicate the estimation of the first model of Table VII while also including the residuals obtained from the first stage. The statistical significance of this coefficient confirms our concern about endogeneity issues. The negative sign suggests that firms with lower market share were more likely to self-select to have an outsourcing policy. This finding appears reasonable because small and new companies usually have lower market share and might be more interested in becoming involved in outsourcing arrangements. After controlling for this, we confirm the causal and positive effect of an outsourcing policy on market share.

Table IA.3: Outsourcing and Market Share: Endogeneity Issues – 2SRI

Panel A presents the monthly logistic regressions in the 1ST stage regression of the 2SRI estimation of the effect of firm sub-advisory policy on fund family market share. This first specification measures the effect of internal firm concentration in assets managed across investment objectives on the policy of arranging sub-advisory agreements. Panel B shows the 2nd stage of the 2SRI estimation of the effect of the sub-advising policy on firm market share under a Fama-MacBeth (1973) approach. The sample includes all U.S. management companies from 1996 to 2011. The dependent variable in Panel A is **Outsourcing Policy**, a dummy variable that equals 1 for management companies that are currently offering at least one sub-advised fund. **Herfindhal In-house Styles** is the sum of the squared fractions of each investment objective's share in total management company assets of in-house managed funds**.** In Panel B, the dependent variable is **log(market share)**, the natural logarithm of the sum of all assets under management by each management company divided by all assets under management in the industry in that period. **Residual 1ST Stage** is the residual from the 1st stage logistic regression of the 2SRI estimation. The remaining variables are a set of controls previously described. Time dummies are included but not reported, and the constant term has been omitted. P-values are reported in parentheses using robust standard errors. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level. The baseline predicted probability of Panel A is 0.378.

	Panel A: *(1st Stage)* - Outsourcing Policy		*Panel B*: *(2nd Stage)* - Log (Market Share)
	Coef/p-value	Mfx/Std	Coef/p-value
Herfindahl In-house Styles	1.738***	0.386***	
	(0.00)	0.311	
Outsourcing Policy			0.3153**
			(0.04)
Firm Expenses	0.412***	0.092***	-0.0307
	(0.00)	0.549	(0.41)
Firm Performance	-0.014*	-0.003*	0.0008
	(0.09)	2.028	(0.27)
Funds Started	-0.003	-0.001	-0.0067
	(0.72)	2.077	(0.38)
Firm Funds	0.794***	0.177***	0.1411
	(0.00)	1.342	(0.15)
Firm Turnover	0.015	0.003	0.0616*
	(0.36)	1.563	(0.10)
Firm Experience	-0.098***	-0.022***	2.9971***
	(0.00)	0.810	(0.00)
Top 5% Performance	0.017	0.004	-0.0048
	(0.71)	0.499	(0.21)
Herfindahl across funds	-2.340***	-0.520***	0.0491
	(0.00)	0.320	(0.51)
Past Market Share			0.1168**
			(0.05)
Residual 1st Stage			-0.1097**
			(0.02)
Time Dummies	Yes		Yes
Observations	24623		24623
Pseudo R2	0.223		

3.3 Investor Sophistication and Outsourcing

Table IA.4 provides the results from estimating different specifications of equation [9]. More specifically, we replicate Column 5 from Table VIII for each of the mechanisms separately. We can observe that while in general, investors are more sensitive to performance in the middle and high ranks, specific investors from funds with co-branding, multi-advising (weak evidence) and performance fee arrangements are more sensitive to performance in the low rank. These results are also consistent with our hypothesis and provide more robustness to our claims that mechanisms are only employed for mutual funds with sophisticated investors (those selling the poorest performing funds).

Table IA.4: Flow-Performance Sensitivity: Sub-advised Funds (II)

This table presents results for the regressions of the growth rate of net new money on fund return ranks. The dependent variable is Fund Flows, the percentage of net new inflows into the fund over the previous year. The independent variables based on fund returns are estimated using a piecewise linear regression framework to define three linear segments in the flow-performance sensitivity. Each month, by fund investment objective, we rank the funds from 0 to 1 based on their past year gross return. Then, we construct the ranking variables , forming LowRank=min(0.2, rank), MidRank=min(0.6, rank-LowRank) and HighRank=rank-(LowRank+MidRank). **Co-branding** is a dummy variable that equals 1 if the fund is sub-advised under a co-branding arrangement, **Multi-advising** is a dummy variable that equals 1 if the fund is sub-advised by more than one sub-advisor and **Performance-fee** is a dummy variable that equals 1 if the sub-advised fund is under a fulcrum fee compensation structure. **Fund Size** is the natural logarithm of TNA under management in millions of dollars. **Family Size** is the logarithm of TNA for all funds in the family, excluding the fund itself. **Expenses** are the total annual expenses and fees divided by year-end TNA. **StD Monthly Returns** is the standard deviation of the prior year's monthly returns. Control variables are lagged 1 period. Time and Investment Style dummies are included but not reported, and the constant term has been omitted. T-statistics are reported in parentheses, and standard errors are clustered at fund level. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level. The Wald Test is also performed: HighRank=LowRank (p-value:0.00), HighRank=MidRank (p-value:0.00), and MidRank=LowRank (p-value:0.00).

	Net Flows		
	Co-branding	Multi-advising	Performance-fee
Low Rank	-0.2563	-0.2271	-0.2390
	(-1.54)	(-1.35)	(-1.42)
Mid Rank	0.0662**	0.0703**	0.0674**
	(2.11)	(2.19)	(2.12)
High Rank	0.3524**	0.3228**	0.3546**
	(2.21)	(2.02)	(2.21)
Size (log TNA)	-0.2277***	-0.2279***	-0.2279***
	(-16.37)	(-16.38)	(-16.38)
Family Size (log family TNA)	0.0283***	0.0283***	0.0287***
	(5.14)	(5.14)	(5.17)
Expenses	-0.3030***	-0.3010***	-0.3018***
	(-8.62)	(-8.57)	(-8.59)
SD Monthly Returns	0.0190	0.0189	0.0190
	(1.44)	(1.44)	(1.44)
Co-branding	-0.2331**		
	(-2.13)		
Low Rank* Co-branding	2.1862**		
	(2.23)		
Mid Rank* Co-branding	0.0726		
	(0.29)		
High Rank* Co-branding	-1.9708		
	(-1.53)		
Multi-Sub-advising		-0.1066	
		(-1.52)	
Low Rank* Multi-Sub-advising		0.3855	
		(0.85)	
Mid Rank* Multi-Sub-advising		-0.0331	
		(-0.28)	
High Rank* Multi-Sub-advising		-0.4043	
		(-0.67)	

(Continued)

Table IA.4 – *Continued*

Performance-fee			-0.1827**
			(-2.37)
Low Rank* Performance-fee			0.8176**
			(2.04)
Mid Rank* Performance-fee			0.0466
			(0.38)
High Rank Performance-fee			-1.3260**
			(-2.22)
Observations	346481	346481	346481
Adjusted R^2	0.031	0.030	0.032

3.4 Propensity Score Matching

Our first endogeneity concern arises from the idea that funds under these contractual arrangements (co-branding, multi-advising and performance fees) might perform better than other outsourced funds due to a selection criterion from the management companies, which agree to include these mechanisms only for their best funds. Thus, funds managed under these contracts outperform all other funds not because of the effect from aligning incentives per se, but from the effect of the company's portfolio allocation. Therefore, we employ a propensity score matching procedure using Nearest Neighbor from Rosenbaum and Rubin (1983) and Kernel Matching from Heckman et al. (1997, 1998) to identify a control sample of funds without any of the contractual arrangements previously defined and that exhibit no observable differences in characteristics relative to the funds that have the mechanisms. Thus, each pair of matched funds is almost identical to one another except for the main variable of interest: the contractual arrangement. Then, we compare the fund performance between the two groups. As the control funds are restricted to a set of peers that is almost identical in terms of observable characteristics, the funds with contractual arrangements are expected to have the same performance as the funds managed without such contracts.

To implement this methodology, we first calculate the probability (e.g., the propensity score) that a fund with given characteristics is under a contractual arrangement. The propensity score is calculated using the fund and family characteristics that we included in the specification model [1]. More specifically, this probability is estimated as a function of Fund Size, Family Size, Family Funds, Fund Age, Distribution Fee, Expenses, Turnover, Flows

and Past Returns. To ensure that the funds in the control sample (Non-Mechanism) are sufficiently similar to the funds with a mechanism, we require that the maximum difference between the propensity score of the mechanism funds and that of their matching peers does not exceed 0.1% in absolute value.

Table IA.5 compares the fund performance between the two groups and reports the value of the difference (Mechanism vs. Non-Mechanism) and the t-statistic using bootstrapped standard errors associated with that difference. Fund performance is measured by the alpha from CAPM, the Fama-French three factor model (3F), Carhart's 4 factor model (4F), Carhart's model augmented by an international index (5F) and a global bond index (6F) and Carhart's model augmented by 3 government bond indexes and 2 corporate bond indexes (9F). The sample contains all of the U.S. mutual funds that have been sub-advised with a potential managerial conflict of interest between 1996 and 2011. Panels A and B show that the difference between the two groups is positive and statistically significant, suggesting that outsourced funds with mechanisms outperform those without mechanism by between 22.8 and 80.4 bps per year. These results confirm that even when holding observable characteristics virtually identical between sub-advising funds under contractual arrangements and those without them, the former appear to be much better managed.[30]

[30] These results are also robust using the radius and stratification matching methods.

Table IA.5: Sub-advising Mutual Funds Using Mechanisms: Propensity Score Matching

In this table, we compare the fund performance between two groups (with mechanism and without mechanism) of outsourced mutual funds managed by a sub-advisor with a conflict of interest. To identify a control sample, we employ two different propensity score matching procedures: Nearest Neighbor from Rosenbaum and Rubin (1983) and the Kernel Matching of Heckman et al. (1997, 1998). The difference between the propensity score of the funds managed with mechanisms and their matching peers (funds without mechanism) are required to not exceed 0.1% in absolute value. The propensity score is estimated using all fund and family characteristics previously described (**Fund Size, Family Size, Family Funds, Fund Age, Distribution Fee, Expenses, Turnover, Flows and Past Returns**). Fund returns are calculated before deducting fees and expenses (gross return), and fund performance is measured by the alpha from CAPM, the Fama-French three factor model (3F), Carhart's 4 factor model (4F), Carhart's model augmented by an international index (5F) and a global bond index (6F) and Carhart's model augmented by 3 government bond indexes and 2 corporate bond indexes (9F). The sample contains all U.S. mutual funds that have been sub-advised with a potential managerial conflict of interest during 1996 and 2011. Figures in this table represent the difference in performance between the two groups (Mechanism vs. Non-mechanism) and the significance level using bootstrapped standard errors associated with that difference. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Panel A: Nearest Neighbor						*Panel B: Kernel Matching*					
	ALPHA 1F	ALPHA 3F	ALPHA 4F	ALPHA 5F	ALPHA 6F	ALPHA 9F	ALPHA 1F	ALPHA 3F	ALPHA 4F	ALPHA 5F	ALPHA 6F	ALPHA 9F
	Coef/t	Coef/t	Coef/t	Coef/t	Coef/t	Coef/t	Coef/t	Coef/t	Coef/t	Coef/t	Coef/t	Coef/t
Mechanism vs Non-mechanism	0.029***	0.035***	0.033***	0.033***	0.052***	0.067***	0.021***	0.022***	0.019***	0.020***	0.039***	0.047***
Observations	38251	38251	38251	38251	38251	38251	38251	38251	38251	38251	38251	38251

3.5 Fund Performance around Mechanism Contracting

To test whether management companies benefit from including a contractual arrangement such as co-branding, multi-advising or performance fees in their outsourcing contracts, we conduct an event study that analyzes fund performance before and after the portfolio adopted a mechanism in their outsourcing arrangement. The analysis is conducted for the entire sample (1996 to 2011) of funds that were sub-advised to an unaffiliated management company that was also managing its own funds, but we focus only on funds that were initially outsourced without a mechanism but at some later time period, added a mechanism to the outsourcing agreement. In Panel A, we show the results only 5 months before and after the date on which the mechanism is incorporated into the outsourcing agreement, but in Panel B, the results take into account the entire range of sample data.

Table IA.6 shows that, in general, writing contractual arrangements over a specific outsourced fund leads to an improvement in fund performance, not only at the time the contract is written but also during the subsequent months. For example, the average risk-adjusted return (using the alpha from Carhart's model augmented by an international index and a global bond index) for one month before the writing of a co-branding arrangement is -0.149%; after the contract is written, the average of those funds changes to -0.045%, which represents a improvement of approximately 70%. Similar results are found for the other types of contracts. The last four rows of each panel contain the overall fund performance before and after contracting using any of those mechanisms, the difference and the associated t-statistics for their difference in means. Independent of the contractual arrangement taken, we can confirm that the average performance of the funds with mechanisms is greater than prior to implementing the mechanism. This difference can reach up to 48 bps per year for co-branding contracts or even 57.6 bps per year in the case of multi-advising funds, for example. These improvements are statistically significant at the 1% level.

Table IA.6: Event Study - Fund Performance Around Mechanism Contracting

This table presents average fund performance (using the alpha from Carhart's model augmented by an international index and a global bond index (6F)) before and after a mutual fund incorporates a mechanism into the outsourcing agreement. In Panel A, we present the average fund performance during the five months before and after the portfolio contracted a mechanism for its outsourcing arrangement. In Panel B, we present the average performance of funds before incorporating the mechanism (from the beginning of the sample or the date the fund was created) and after adding the mechanism (from the next month to the end of our sample or the date the fund closes). Co-branding refers to funds that use the sub-advisor's reputation by including the sub-advisor's name in the fund's name. Multi-advising refers to funds sub-advised by more than one sub-advisor. Performance fee applies when the sub-advised fund charges a floating fee that depends on prior fund performance. In the last column, Mechanism considers the average fund performance of mutual funds using any of the previous mechanisms (co-branding, multi-advising and/or performance fee). The analysis is conducted for the entire sample from 1996 to 2011 for funds that were sub-advised to an unaffiliated management company that was also managing its own funds. The last four rows of each panel contain the overall fund performance before contracting any of those mechanisms and after, the difference and the associated t-statistics for their difference in means.

Portfolios with Potential Conflict of Interest that Adopt any Mechanism				
Panel A: Average Fund Performance from 5 Months Previous to 5 Months after Using a Mechanism				
Months Before / After Event	Co-branding	Multi-advising	Performance-fee	Mechanism
-5	-0.115	-0.057	0.026	-0.109
-4	-0.121	-0.058	0.060	-0.111
-3	-0.133	-0.052	0.078	-0.115
-2	-0.130	-0.051	0.096	-0.117
-1	-0.149	-0.049	0.002	-0.106
0	-0.045	0.004	0.118	-0.057
+1	-0.061	0.003	0.107	-0.058
+2	-0.059	0.006	0.080	-0.039
+3	-0.047	0.010	0.095	-0.029
+4	-0.063	0.012	0.152	-0.053
+5	-0.055	0.008	0.149	-0.047
Panel B: Average Fund Performance from 1996 to 2011				
Performance Before	-0.039	-0.032	-0.029	-0.023
Performance After	0.001	0.016	-0.004	-0.007
Difference	0.040	0.048	0.024	0.017
t-stat	8.76	8.68	4.84	3.58

4. Alternative Interpretations

4.1 The Consequences for Investors

In this paper, we demonstrate that using any mechanism in outsourcing agreements when there is a conflict of interest eliminates the underperformance evidenced by the previous literature. Further, we show that this result is explained by the alignment of interests between the agent and the principal. If the improvement in performance does not come from this alignment of

interests but from a selection of better portfolio managers for mutual funds using mechanisms, then the shareholders could not profit from it. It might be possible that investors do not benefit from this improvement if better managers, who will be charging higher fees, are allocated to these funds, and this higher cost is eventually passed on to the final investors. One way of ruling out this alternative interpretation is to examine the consequences of these organizational decisions for the final investor and to examine whether the firms are charging higher fees for managing these funds.

To test this, we will follow the same approach used in section 4.1 and replicate the estimation of equation Panel A - Table III, but now our dependent variable is fund performance using fund returns after deducting fees and expenses (net return). Table IA.7 presents the results for the monthly Fama-MacBeth (1973) estimates of this model. We find that not only the outsourced funds that include a contractual arrangement improve their performance by between 105.5 bps and 201.7 bps per year but also the average fund using any of these contracts outperforms all other funds (including in-house managed ones) by up to 118.6 bps per year. Comparing these results with those from Table III, we observe that the improvement from using a mechanism in outsourced funds with a conflict of interest is even higher in terms of net returns. These results suggest that management companies are aware of the type of investors they are facing, and they not only protect the more informed investors against agency issues from outsourcing contracts but also charge them lower fees. Thus, externally managed funds with a contractual arrangement (that is oriented to sophisticated investors) are not showing better risk-adjusted returns only because better portfolio managers (with higher fees) are allocated to those funds but also because incentives are aligned and investors are charged lower fees.

Table IA.7

Sub-advising Mutual Funds Using Mechanisms: Net Performance (after-fee)

Table IA.7 presents results for monthly Fama-MacBeth (1973) estimates of risk-adjusted returns on fund characteristics. The sample contains all U.S. mutual funds from 1996 to 2011. Fund returns are calculated after deducting fees and expenses (net returns). The dependent variable is fund performance measured by the alpha from CAPM (1F), the Fama-French three factor model (3F), Carhart's 4 factor model (4F), Carhart's model augmented by an international index (5F) and a global bond index (6F) and Carhart's model augmented by 3 government bond indexes and 2 corporate indexes (9F). **Conflict** is a dummy variable that equals 1 if the fund is sub-advised by an unaffiliated firm that also manages its own funds and 0 otherwise. **Mechanism** is a dummy variable equal to 1 if the fund is sub-advised using either Co-branding, Multi-manager or Performance fee arrangements and 0 otherwise. The iteration term **Conflict*Mechanism** is also included to examine the effect that these mechanisms exert over conflicted funds. **Fund Size** is the natural logarithm of TNA under management in millions of dollars. **Family Size** is the logarithm of TNA for all funds in the family, excluding the fund itself. **Family Funds** indicates the logarithm of the number of funds in the family, excluding the fund itself. **Fund Age** is the logarithm of the number of years since inception. **Distribution Fee** is the percentage of assets the fund charges for distribution and marketing under the 12b-1 fee. **Expenses** are the total annual expenses and fees divided by year-end TNA. **Turnover** is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. **Flow** is a percentage that represents new inflows into the fund over the previous year. **Past** Returns is the fund's past years' gross risk-adjusted return. Control variables are lagged 1 period. Investment Style dummies are included but not reported, and the constant term has been omitted. The t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987)). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Net Fund Performance (after-fee)					
	ALPHA 1F	ALPHA 3F	ALPHA 4F	ALPHA 5F	ALPHA 6F	ALPHA 9F
Conflict*Mechanism	0.1032***	0.1343***	0.1570***	0.1681***	0.1459***	0.0879**
	(4.15)	(5.48)	(5.61)	(6.03)	(5.67)	(2.22)
Conflict	-0.0326**	-0.0390**	-0.0445***	-0.0482***	-0.0328*	-0.0414**
	(-2.33)	(-2.43)	(-2.74)	(-2.87)	(-1.81)	(-2.08)
Mechanism	0.0365**	0.0663***	0.0654***	0.0984***	0.0988***	0.0089***
	(2.38)	(6.23)	(6.26)	(5.61)	(5.11)	(3.73)
Fund Size (log TNA)	-0.0151***	-0.0146***	-0.0154***	-0.0175***	-0.0187***	-0.0077**
	(-4.90)	(-4.97)	(-5.01)	(-5.30)	(-5.47)	(-2.21)
Family Size (log family TNA)	0.0256***	0.0413***	0.0451***	0.0578***	0.0565***	0.0271***
	(3.55)	(7.42)	(7.22)	(10.56)	(11.48)	(3.41)
Family Funds	-0.0460***	-0.0747***	-0.0819***	-0.0995***	-0.0954***	-0.0521***
	(-4.28)	(-8.11)	(-7.80)	(-9.98)	(-11.53)	(-4.51)
Fund Age	0.0009	0.0008	0.0008	0.0017	0.0019*	0.0008
	(1.18)	(0.97)	(0.92)	(1.57)	(1.87)	(0.95)
Distribution Fee	-0.2262***	-0.3516***	-0.3818***	-0.5143***	-0.4669***	-0.1058
	(-3.51)	(-7.34)	(-7.20)	(-10.51)	(-9.19)	(-1.63)
Expenses	0.1830**	0.3285***	0.3698***	0.5230***	0.4750***	0.0793
	(2.51)	(6.34)	(6.24)	(9.36)	(8.51)	(1.07)
Turnover	0.0105	0.0159**	0.0180**	0.0233***	0.0193***	0.0099
	(1.60)	(2.27)	(2.47)	(3.18)	(2.68)	(1.15)
Flows	-0.0043	-0.0005	0.0007	-0.0010	-0.0016	0.0022
	(-1.27)	(-0.15)	(0.20)	(-0.25)	(-0.39)	(0.64)
Past Returns	0.0449***	0.0370***	0.0377***	0.0420***	0.0410***	0.0250***
	(9.60)	(14.63)	(14.39)	(8.96)	(9.23)	(7.12)
Style Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	346481	346481	346481	346481	346481	346481
R^2	0.289	0.261	0.264	0.283	0.265	0.221

4.2 Fund Closure, Sub-advisor Replacement and Board Compensation

Chen et al. (2003) have shown that outsourced funds are more likely to be closed down than in-house managed funds, especially after being poorly managed and displaying high levels of risk taking. Additionally, managerial replacement might also be an important determinant of management behavior (Chevalier and Ellision (1999) or Kempf et al. (2009)). Some outsourced funds might be performing worse than others because they benefit from softer monitoring. Thus, the boards of directors of these funds might also play a role in shaping managerial incentives.

We would expect that after controlling for fund family, the tendency to close funds, the tendency to replace sub-advisors and compensation to the board of directors, we will still find that the use of mechanisms exerts a positive impact on the fund performance of sub-advised funds that face managerial conflicts of interest.

We measure *Fund Closures* with the number of funds that the fund family has closed in that period relative to the total number of funds the firm is managing. This will be a proxy for the entrenchment of these funds within the fund family rather than a disciplinary policy, as unlike the contractual arrangements we have been analyzing, the decision to close a fund is taken after the performance has been realized. We also consider the event of firing a sub-advisor with the variable *Sub-advisor Replacement*, which contains the number of sub-advisors that have been replaced within a family relative to all funds that family is offering. We would not expect to have better performing funds in families that generally fire their sub-advisors more often as the consequence of this replacement might be poor management. However, we expect this policy to have a disciplinary effect on those funds that are managed under a managerial conflict of interest, as by including this variable, we will control for different board policies about sub-advisor replacement. Finally, we will also examine how different board compensation affects management behavior and the effect of the contractual arrangement on the final fund performance. We measure *Board Compensation* using the proportion of the fee that the family collects from each fund that goes to the board of directors of that fund.

Table IA.8 shows the results for the monthly Fama-MacBeth (1973) estimates of risk-adjusted returns using the alpha from Carhart's model augmented by an international index and a global bond index (Alpha 6F) on the different governance policies, the outsourcing decisions and other fund and family characteristics. We can observe that the tendency to close funds and board compensation has no effect on the outsourced funds with conflicts, however, better governance in terms of replacing sub-advisors will positively affect the performance of these portfolios. We finally show that even when we control for different governance features of funds and families, our main results remain unchanged. Outsourced funds with a potential conflict of interest underperform their in-house managed peers between 80.9 and 87.1 bps per year, while those that are under a mechanism obtain an improvement of 74.4 to 79.2 bps per year.

Table IA.8 Fund Closures, Sub-advisor Replacement and Board Compensation

Table IA.8 presents results for monthly Fama-MacBeth (1973) estimates of risk-adjusted returns on fund characteristics. The sample contains all the U.S. mutual funds from 1996 to 2011. Fund returns are calculated after deducting fees and expenses (net return). The dependent variable is fund performance measured by the alpha from the Carhart's model augmented by an international index and a global bond index (6F). **Fund Closures** measures the number of funds the fund family has closed in that period relative to the total number of funds the firm is managing. **Sub-advisor Replacement** contains the number of sub-advisors that have been replaced within a family, relatively to all the funds that family is offering. **Board Compensation** measures the proportion of fee the family collects from a fund that goes to the board of directors of that fund. Control variables are lagged 1 period. Investment Style dummies are included but not reported; and the constant term has been omitted. The t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987)). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1%level.

	Fund Performance					
	Fund Closures		Sub-advisor Replacement		Board Compensation	
	(1)	(2)	(3)	(4)	(5)	(6)
Conflict	-0.0724***	-0.0674***	-0.0725***	-0.0726***	-0.0725***	-0.0723**
	(-6.43)	(-6.07)	(-6.42)	(-6.56)	(-6.70)	(-2.55)
Mechanism	-0.0074	-0.0068	-0.0068	-0.0064	-0.0075	-0.0075
	(-0.67)	(-0.62)	(-0.61)	(-0.58)	(-0.74)	(-0.74)
Conflict*Mechanism	0.0660**	0.0620**	0.0659**	0.0646**	0.0632**	0.0635**
	(2.50)	(2.39)	(2.49)	(2.45)	(2.41)	(2.51)
Fund Closures	-0.2474*	-0.2832**				
	(-1.85)	(-2.06)				
Sub-advisor Replacement			0.3846	0.4227		
			(1.08)	(0.22)		
Board Compensation					-0.2477	-0.3477*
					(-1.27)	(-1.82)
Conflict*Fund Closures		0.0356				
		(0.12)				
Conflict*Sub-advisor Replacement				0.2990**		
				(2.20)		
Conflict*Board Compensation						-4.2324
						(-0.40)
Fund Size (log TNA)	0.0100	0.0100	0.0099	0.0098	0.0096	0.0100
	(0.51)	(0.53)	(1.44)	(0.42)	(1.43)	(0.51)
Family Size (log family TNA)	0.0088***	0.0088***	0.0087***	0.0087***	0.0085***	0.0078***
	(4.17)	(4.16)	(4.17)	(4.19)	(4.14)	(3.73)
Family Funds	-0.0188***	-0.0188***	-0.0188***	-0.0188***	-0.0188***	-0.0177***
	(-4.76)	(-4.76)	(-4.79)	(-4.81)	(-4.68)	(-4.25)
Fund Age	-0.0085	-0.0086	-0.0086	-0.0085	-0.0075	-0.0092
	(-1.39)	(-1.40)	(-1.42)	(-1.41)	(-1.28)	(-1.48)
Distribution Fee	-0.0907***	-0.0912***	-0.0911***	-0.0910***	-0.0974***	-0.1005***
	(-4.53)	(-4.57)	(-4.56)	(-4.55)	(-4.92)	(-5.10)
Expenses	0.0759***	0.0759***	0.0759***	0.0758***	0.0787***	0.0793***
	(3.78)	(3.78)	(3.78)	(3.77)	(3.86)	(3.88)
Turnover	0.0051*	0.0051*	0.0051*	0.0051*	0.0054*	0.0050*
	(1.92)	(1.89)	(1.91)	(1.89)	(1.97)	(1.86)
Flows	0.0171***	0.0171***	0.0172***	0.0172***	0.0169***	0.0166***
	(5.68)	(5.69)	(5.75)	(5.77)	(5.62)	(5.43)
Past Returns	0.0011*	0.0011*	0.0011*	0.0011*	0.0010*	0.0010*
	(1.87)	(1.88)	(1.87)	(1.87)	(1.76)	(1.73)
Style Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	346481	346481	346481	346481	346481	346481
R^2	0.131	0.132	0.130	0.130	0.133	0.133

Chapter 3: The Relevance of Portfolio Management Core Competencies in Outsourcing Decisions

1. Introduction

Despite the growth of outsourcing portfolio management in the mutual fund industry, relatively little research has been conducted on how outsourcing decisions are made. Studies of this new business model for mutual funds have compared the performance of outsourced funds to that of funds managed in-house. Issues such as which funds should be transferred to external companies or how to choose the best sub-advisor have not yet been explained. The aim of this chapter is to analyze the relevance of core competencies in outsourcing decision-making within the mutual fund industry. Once we clarify the factors upon which these outsourcing decisions are made, it is likely that we will be able to explain the high growth rate of outsourcing in mutual funds over the last decade.

Previous research on industrial organization indicates that companies should focus on the tasks or products that perform best, that is, their core competency, and outsource other activities to companies whose core competencies are aligned with those activities. This specialization generates the following efficiency gains: *i)* the company can focus on its core competency (which provides a competitive advantage) and thus improve performance (Quinn (1992); Ellram and Billington (2001)), and *ii)* the activities outsourced to other companies, which specialize in that activity, will also be completed more efficiently than if they were performed internally (Hamel and Prahalad (1990); Venkatesan (1992) and Quinn and Hilmer (1994)). Therefore, the core competency of a company is an important strategic component of outsourcing decisions (as Quinn and Hilmer (1994) noted). For many years, companies have been motivated to identify and focus on core competencies - the skills, knowledge and technologies a company must possess to be competitive (Hamel and Prahalad (1990)).

Prahalad and Hamel (1990) define a core competency as "a harmonized combination of multiple resources and skills that distinguish a firm in the marketplace." Core competencies must provide potential access to a wide variety of markets, make a significant contribution to

the perceived customer benefits of the final product and be difficult to imitate by competitors. For investment companies, the core competency is clearly portfolio management, which is more important than any other activity performed by the company (such as accounting and marketing). However, many investment companies manage different types of mutual funds (in some cases, this can be explained by the desire of a firm to provide a superior menu of options for its customers to retain them (Massa (2003))), but the investment company specializes in only one of these types (which includes most of its funds and/or where it employs the largest number of managers). In this chapter, the core competency of a fund family is defined as the most common investment style among all the assets under their management.[31] We hypothesize that by outsourcing the funds that are not within their core investment style, fund families can focus their efforts and skills on managing funds in which they have a competitive advantage to maximize performance while benefiting from the cost savings of outsourcing agreements.

We analyze the role of core competencies in outsourcing decisions in the mutual fund industry and consider whether these explain the growth of outsourcing in this industry over the last decade. First, we examine whether the advisor's core competency affects the selection decision of which funds are managed externally and whether the sub-advisors are chosen based on their core competencies. The results indicate that core competencies affect both decisions. Specifically, our results are consistent with previous research on industrial organization, i.e., an advisor is more likely to outsource the management of funds outside his core competency and keep funds that are within his core competency in-house. The core competency of the sub-advisor selected to manage an outsourced fund is likely to be consistent with that fund.

Second, we examine whether the performance of the mutual fund industry has improved due to the outsourcing of portfolio management to explain the high growth rate of this practice over the last decade. We indeed observe that funds managed by external companies

[31] For example, our dataset indicates that in 2011, AMERICAN BEACON ADVISORS, INC. managed a total of $14.038 million, of which $11.077 million was in equity funds, $666,000 in debt funds, $959,000 in balance funds and $1.335 million in international funds. In this case, the core competency is the management of equity funds, in which the company is more experienced.

specializing in that investment style achieve better performance. Additionally, advisors who outsourced the management of funds that exceeded their core competency improved the performance of the funds managed internally compared to investment companies that maintained in-house management of such funds. This improvement in the performance of in-house funds is consistent with the body of literature on industrial organization and explains the growth in outsourcing of funds that seems complicated (irrational) if we solely consider previous research that suggests that externally managed funds underperform internally managed funds.

In the final part of this study, we demonstrate that the core competency remains an important factor in firm outsourcing decisions even when other factors are involved, such as pre-existing commercial relationships. Previous studies (e.g., Poppo and Zenger, 2002) indicate the importance of previous interactions between companies in subsequent agreements or contracts. In addition, in the fund industry, Kuhnen (2009) observes that a firm is more likely to subcontract to companies when connections between the boards of directors exist.

2. Hypothesis Development

Recent studies of family decisions in mutual funds indicate that families face incentives to increase the menu of funds offered to customers, increasing both the number of funds and the investment objectives. Massa (2003) noted that fund proliferation is a tool used by fund families to increase market coverage and limit competition given the free-switching options offered to investors (that is, firms allow switching across funds belonging to the same family at no cost). Gallaher et al. (2006) observes that the more investment strategies a mutual fund family offers, the larger the flows of funds received. Additionally, Khorana and Servaes (2012) find that families that offer a wider range of products and differentiated funds relative to the competition are characterized by higher market shares. They observe that price competition and product differentiation are both effective strategies to increase market share in the mutual fund industry.

Prior research in management has noted that outsourcing decisions play a key role in the overall performance of an organization by improving resource allocation. Thus, activities that

are not within the core competencies of a firm should be outsourced (e.g., Hamel and Prahalad (1990); Venkatesan (1992); Quinn and Hilmer (1994); Baden-Fuller and Hunt (2000); Díaz et al. (2000) and Wu et al. (2003))[32] to allow the firm to focus on a limited set of strategically important tasks. This, in turn, leads to the continuous development of core competencies (Quinn (1992); Kotable (1990) and Venkatraman (1989)). Prior research demonstrates that by specializing on a limited activity structure, companies that outsource are able to improve the performance of their in-house activities (Quinn (1992) and Ellram and Billington (2001)).

Siggelkow (2003) demonstrates that U.S. mutual funds that belong to focused fund providers outperform similar funds offered by diversified providers. Focusing on a few investment objectives allows management companies to manage funds more effectively and improve fund performance. However, a negative effect of this focused strategy arises. Fund families will reduce cash inflows, thus affecting profitability, because they do not benefit from the demand externalities generated by a broad product offering. Fund families benefit from offering a wide array of funds, as noted in the body of literature discussed above (Massa (2003); Gallaher et al. (2006) and Khorana and Servaes (2012)). Siggelkow (2003) described the organizational solution to this duality in the mutual fund industry as follows: fund providers could outsource the investment management of funds that are not consistent with the investment culture of the fund family to improve the performance of funds managed in-house without reducing the growth opportunities provided by new funds and investment styles.

We analyze whether the rapid growth of outsourcing in the mutual fund industry over the last decade is consistent with this explanation. Outsourcing the activities beyond the core competency of the family improves the performance of funds managed internally without preventing the growth and diversification families require. Our hypotheses are as follows:

HYPOTHESIS 1: Management companies are more likely to outsource the management of funds outside their core competency.

[32] Some other surveys of this literature on outsourcing, from a variety of perspectives, include Joskow (1988) or Shelanski and Klein (1995) and more recent Grossman and Helpman (2002).

HYPOTHESIS 2: Outsourced mutual funds are more likely to be allocated to subadvisors with a high level of experience in the mutual fund's investment objective or class of investment.

HYPOTHESIS 3: The closer the core competency of a subadvisor to the investment style of the outsourced fund (i.e., the higher the subadvisor expertise), the better the performance of the outsourced mutual fund.

HYPOTHESIS 4: Families outsourcing the management of funds outside of their core competency show better in-house fund performance than families that do not outsource.

The industrial organization literature has noted that the performance (or efficiency) of outsourced activities (outside a firm's core competency) will improve when performed by an external specialist. However, in the case of the outsourcing of mutual funds, previous research (e.g., Chuprinin et al. (2012); Moreno et al. (2012)) has demonstrated that externally managed mutual funds underperform regarding in-house funds, which seems to contradict the postulates of the organization literature. This research has demonstrated that management firms tend to favor their own funds to the detriment of subadvised funds through preferential treatment of IPO allocations (Chen at al. (2013) or Duong (2010)) and other unobserved actions (Chuprinin et al. (2012)). This includes abnormal cross-trading activity between in-house and external funds, especially when the in-house fund must sell some assets quickly, or offering preferential information to the in-house funds. Chen et al. (2013) argue that funds managed externally significantly underperform those managed internally due to contractual externalities and firm boundaries that make it difficult to extract performance from an outsourcing relationship. Considering only funds managed by advisors that have both in-house and subadvised funds, Duong (2010) finds that the latter underperform in-house managed funds, which suggests possible conflicts of interest for management firms. For instance, Moreno et al. (2012) argue that management companies favor their own funds by transferring relatively poorly performing portfolio managers to outsourced funds, which explains the underperformance of external funds. Alternatively, Chuprinin et al. (2012) suggest that in-

house funds benefit from the subsidization of outsourced funds as part of the incentive compensation of the subadvisory company.

To analyze the influence of core competencies (expertise) on the performance of mutual funds more deeply, we next consider the extreme case in which the principal advisor has null experience (which is defined as core competency assigned a value lower than 0.05). We expect that when the outsourced fund is very far from the core competency of the advisor, outsourcing could help improve the mutual fund's performance. This distance represents a special case in which fund families face incentives to outsource and provides another explanation of the increased outsourcing of mutual funds over the last decade.

HYPOTHESIS 5: When the advisor's core competency is very far from the mutual fund style of investment, outsourcing portfolio management will positively affect performance.

Our final hypothesis is related to the hiring of sub-advisors based not only on their core competency and compatibility with the fund style but also on previous business relationships between the fund family and sub-advisor.[33] A previous business relationship between the advisor and sub-advisor reduces the cost of establishing the agreement and decreases uncertainty about the sub-advisor's behavior in an outsourcing contract. Kuhnen (2009) analyzes how outsourcing decisions are influenced by connections between the boards of directors and finds that sub-advising contracts are more likely when such relationships are strong. To the best of our knowledge, no previous research addresses the influence of commercial relationships in outsourcing decisions in the mutual fund industry. We hypothesize that commercial relationships are relevant but that the sub-advisor's core competency is also a critical factor in deciding which external firm is hired to manage funds. Selecting a sub-advisor with experience in a specific investment style and firms with an existing commercial relationship will positively affect performance. In these cases, the advisor possesses information about the sub-advisor from previous contracts that can be used to improve the performance of the outsourced funds and to select an advisor with a compatible

[33] In a different industry, Poppo and Zenger (2002) highlighted the importance of previous business relationships in contract arrangements.

core competency. Consequently, a combination of these two factors produces the optimal arrangement.

HYPOTHESIS 6: A strong commercial relationship between a fund family and a subadvisor will be relevant in selecting a subadvisor for portfolio management. However, selecting a subadvisor based on both core competency and previous commercial relationships should improve performance more than basing the decision on only one of these factors.

3. Data Description and Summary Statistics

3.1.Data Sources

We examine actively managed U.S. mutual funds during the period 1996-2011. The data were obtained from two main sources: Security Exchange Commission (SEC) filings and the Center for Research in Security Prices (CRSP) mutual funds database. Data on sub-advisors, advisory arrangements, fund investment styles and fees were obtained from the Form NSAR filings. Fund returns, total net assets, turnover, expenses and other available fund characteristics were obtained from CRSP.

Under the Investment Act of 1940, every investment company must register with the SEC. All U.S. mutual funds and other regulated investment management companies are required to file Form NSAR (along with other documents) on a semi-annual basis. Form NSAR-A covers the first six months of the fiscal year for an individual investment management company, while Form NSAR-B covers the full year. A mutual fund family, also known as a family complex, is composed of several mutual fund series, each of which (also known as a fund trust) may consist of several mutual funds. Each mutual fund series is legally formed as an investment company. Thus, each family complex may file several NSAR forms for each fund trust along with detailed information about each mutual fund.

To create our database, we first downloaded and parsed all NSAR-B filings available from the SEC's EDGAR database, comprising a total of 55,315 files. Although certain funds voluntarily filed their reports prior to the mandatory disclosure period (some were filings

available by 1993), the data were consistently reported beginning in 1996. To mitigate selection bias among early filers, our sample begins with 1996 data. The initial dataset includes the population of U.S. open-ended mutual funds from 1996 to 2011.[34]

Mutual fund returns and characteristics are obtained from the CRSP Survivorship-Bias-Free U.S. mutual fund database for the same period (1996-2011). The CRSP database contains information about multiple fund classes issued by a particular fund. These classes, typically denoted A, B and C, have the same underlying portfolio. The main difference among them is the fee structure. Our observations are made at the class level. We group data by observations at the fund level, consistent with the literature (e.g., Gaspar et al. (2006) or Nanda et al. (2004)). We aggregate returns, weighting each class by total net assets (TNA). We compute the TNA of the fund as the sum of all TNA over all classes. Turnover and expenses are aggregated at the fund level by weighting each class by its total net assets; to determine fund age, we select the oldest class. To merge the CRSP and NSAR data, we utilize a fuzzy match procedure with Weighted Jaccard Distances (for details about this procedure, see Moreno et al. (2012)).

3.2.Summary statistics and preliminary results

Table 1 reports the number of funds collected in our sample after accounting for the share classes described in the previous section. Table 1 is divided into two different panels based on whether funds are categorized by asset class (Panel A) or investment objective (Panel B).[35] Panel A groups the funds into four asset classes by whether the fund primarily invest in equity, fixed income, a mix of equity and fixed income (balance) or international assets. Before 2000, the sample was dominated by debt funds but subsequently by equity funds. The bottom row of Table 1 presents the average annual percentages representing each asset class or objective.

[34] Of the initial 55,315 filings, we exclude filings for 1994 and 1995 and filings in which no names for the trust appear, resulting in 43,537 filings. In addition, we exclude index funds and funds missing an advisor name.
[35] More detailed information about the methodology used to create this dataset can be found in Moreno et al. (2012), http://ssrn.com/abstract=2138998.

Equity funds, at 43.6%, are the largest group, followed closely by debt funds at 39%. Balance and international funds represent only 4.9% and 12.5% of our sample, respectively.

Panel B of Table 1 classifies the main groups of funds, equity and debt, according to the investment objective indicated on their NSAR forms. Equity mutual funds include seven groups: aggressive capital appreciation, capital appreciation, growth, growth and income, income and total return assets. We preserve the growth and total return categories from the filings, but due to the small number of observations and the similarity between aggressive capital appreciation and capital appreciation and between growth and income and income objectives, we combine them into capital appreciation and income, respectively. Debt funds include government long-term, government short-term and corporate debt. Capital appreciation dominates the sample of equity funds, with a time series average of 47.5%, while government long-term dominates debt funds, representing 55.9%.

The Table 2 reports some summary statistics for advisor and sub-advisor expertise for all funds in our sample. Panel A examines the advisor expertise for two different groups of funds: in-house managed funds and outsourced funds. Panel B examines sub-advisor expertise for outsourced funds. Advisor (sub-advisor) expertise is defined as the percentage of their TNA for that particular asset class or investment objective over the total TNA managed by the advisor (sub-advisor). Table 2 also presents the proportion of funds managed by fully experienced (FullExp) and non-experienced (NonExp) companies. The figures indicate that, for all asset classes and investment objectives, advisor expertise in funds managed in-house is greater than their expertise in outsourced funds. This fact yields a first insight: management companies manage in-house funds from styles in which they have more experience and outsource those in which they have less expertise. The proportion of advisors without experience managing a particular style or asset class is a key figure. For example, for all balance funds that were outsourced, 70% of advisors had no experience in this asset class. For outsourced international funds, 61% of advisors had no experience. It seems reasonable that experience managing a particular asset class of is one of the main drivers of outsourcing decisions.

TABLE 1: NUMBER OF FUNDS PER YEAR, ASSET CLASS AND INVESTMENT OBJECTIVE

Table 1 reports the number of funds in our sample after accounting for the different classes. Panel A classifies funds by asset class selected on the NSAR form, equity, debt, balance and international funds, that is, whether the fund primarily invests in equity, debt, both equity and debt or foreign assets, respectively. Panel B groups these funds by the investment objective for equity and debt asset class funds (balance and international funds are excluded). Among the equity classes, there are four objectives: capital appreciation (aggressive capital appreciation and capital appreciation are indicated on the NSAR form), growth, income (growth & income and income as classified on the NSAR form) and total returns. Investment objectives among debt funds are government short-term maturity, government long-term maturity and corporate debt according to the NSAR form. The bottom row presents the average annual percentage for each asset class or objective.

Number of Funds	Panel A: Asset Class				Panel B: Investment Objective						
					Equity Asset Class Funds				Debt Asset Class Funds		
Year	Equity	Debt	Balance	International	Capital Appreciation	Growth	Income	Total Return	Gov ST	Gov LT	Corporate
1996	822	1275	105	310	336	208	214	64	420	739	116
1997	944	1359	135	350	391	253	215	85	443	789	127
1998	1240	1402	171	452	550	319	255	116	478	760	164
1999	1234	1387	171	449	568	324	240	102	434	777	176
2000	1884	1805	232	609	893	479	315	197	481	1102	222
2001	2026	1624	208	561	1004	543	302	177	382	1012	230
2002	2235	1920	214	582	1137	616	299	183	679	1015	226
2003	2218	2081	224	532	1098	671	282	167	720	1112	249
2004	2211	2036	230	515	1079	643	284	205	713	1091	232
2005	2125	1941	243	514	1056	603	261	205	647	1087	207
2006	2071	1834	238	498	1040	562	254	215	639	998	197
2007	2136	1825	239	513	1059	550	255	272	613	1009	203
2008	2715	1848	274	646	1314	687	356	358	623	999	226
2009	3471	1998	365	968	1649	879	498	445	652	1034	312
2010	3215	1874	331	939	1507	797	458	453	578	969	327
2011	1992	1220	186	616	976	483	258	275	238	744	238
Average Percentage	43.6%	39%	4.9%	12.5%	47.5%	26.5%	15.7%	10.3%	31.5%	55.9%	12.6%

TABLE 2: SUMMARY STATISTICS – EXPERTISE PER YEAR, ASSET CLASS AND INVESTMENT OBJECTIVE

Table 2 reports summary statistics for advisor and subadvisor expertise. Panel A examines advisor expertise for two groups of funds: funds managed in-house and funds that have been outsourced to other companies. Panel B examines subadvisor expertise for funds subadvised by an affiliated company. The advisor (subadvisor) expertise is defined as the percentage of their TNA in that particular asset class or investment objective over the total TNA managed by the advisor (subadvisor). The table also presents the proportion of funds managed by fully experienced (FullExp) and non-experienced (NonExp) companies.

	Statistic	Fund Asset Class				Investment Objective (Balance and International funds excluded)						
						Equity Asset Class				Debt Asset Class		
		Equity	Debt	Balance	Internat.	Capital	Growth	Income	Return	Gov ST	Gov LT	Corporate
Panel A: Advisor Expertise												
Inhouse Funds	Mean	60.88	64.68	21.88	38.20	46.28	41.26	30.24	36.32	59.11	35.02	20.11
	Median	62.83	71.65	7.67	19.44	32.32	32.64	15.09	17.50	66.32	21.84	7.11
	Std Dev	33.15	31.02	29.47	38.12	37.26	34.59	33.60	38.11	34.16	32.60	27.68
	NonExp	0.00	0.01	0.07	0.06	0.02	0.05	0.10	0.04	0.09	0.01	0.04
Outsourced Funds	Mean	46.53	41.34	4.23	7.06	16.28	22.33	9.51	12.60	12.72	23.58	3.35
	Median	37.81	30.19	0.00	0.00	2.40	4.44	0.00	0.00	0.00	0.00	0.00
	Std Dev	38.97	41.31	13.56	19.69	27.69	32.64	20.50	27.60	27.57	36.97	10.77
	NonExp	15.25	36.06	70.53	61.94	39.18	35.42	58.51	59.85	74.25	54.99	75.75
Panel B: Subadvisor Expertise												
Outsourced Funds	Mean	78.03	75.25	39.00	67.83	63.73	61.16	46.34	60.95	62.81	56.01	49.47
	Median	99.70	92.56	20.62	100.00	78.79	72.69	34.74	82.79	80.59	61.19	41.41
	Std Dev	30.31	32.53	39.07	40.20	38.70	38.73	40.54	42.04	37.94	39.44	40.34
	FullExp	48.47	40.78	22.52	52.47	41.44	36.69	27.44	44.50	31.46	30.59	29.03

4. Fund Family Decisions: Fund Outsourcing and Subadvisor Selection.

4.1 Principal Advisor Expertise and Fund Outsourcing

We test whether management companies outsource funds in which they are less experienced while maintaining in-house management of funds within the core competency. We estimate the cross-sectional logistic model on a yearly basis for all U.S. mutual funds included in the dataset:[36]

$$Prob(y_{i,t,s} = 1) = \frac{\exp(\beta_j z_i)}{1+\exp(\beta_j z_i)} \qquad \text{for } s \in S, \qquad [1]$$

where $\beta_j z_i = (\beta_0 + \beta_1 E_{i,t} + \beta_2 x_{i,t-1} + \delta_t + \varepsilon_{it})$. The dependent variable $y_{i,t,s}$ takes the value 1 if fund *i* is selected for outsourcing to an unaffiliated company in year *t* and 0 otherwise.[37] These regressions are estimated separately for each style *s*. β_0 represents the constant term, and $E_{i,t}$ represents the main variable of interest, defined as advisor expertise on fund *i*'s style in year *t*.[38] This variable is measured as follows:

$$E_{i,t} = \frac{\text{TNA sum of "fund i" style funds managed by its principal advisor during year "t"}}{\text{TNA sum of all funds managed by the principal advisor of fund "i" during year "t"}} \qquad [2]$$

Thus, for a given fund *i*, the total net assets managed by the management company within its style includes funds from the family the advisor manages and the funds the advisor manages as the sub-advisor to other families (if any) minus all the funds the advisor has outsourced to external firms (if any).[39] x_{it-1} is a set of one period lagged control variables,

[36] This specification will contain only the subsample of funds that are classified within a given style *s*.

[37] Note that our dependent variable is selection and not sub-advising because we will consider only funds from families that also have in-house managed funds as sub-advised funds.

[38] We measure expertise using TNA instead of past performance because we are interested in capturing not only management skills but also how investors react to this performance (flows). TNA captures both features.

[39] We measure the expertise in relative terms (e.g., Equity TNA=principal advisor equity TNA/total principal advisor TNA), where principal advisor equity TNA is the total asset of funds that primarily invest in equity that the advisor is managing, and total principal advisor TNA is the sum of all funds' TNA that advisor is managing.

such as fund size, advisor size, advisor funds, fund age, fund turnover, fund expenses, fund flows and past performance. *Fund size* is the natural logarithm of the TNA under management in millions of dollars. *Advisor size* is the logarithm of all funds' TNA of the advisor, excluding the fund itself. *Advisor funds* is the natural logarithm of the number of funds of that advisor, excluding the fund itself. *Fund age* is the number of years since fund inception. *Fund turnover* is the minimum of aggregate purchases and sales of securities divided by the average TNA over the calendar year. *Fund expenses* are the total annual expenses and fees dividend by the year-end TNA. *Fund flows* represents the new inflows over the previous year. *Past return* is the past years' fund return. We also include time dummies for each year (δ_t). Standard errors (SE) are clustered at the fund level.[40] We also report standard deviations and average marginal effects.

Although the principal advisor or management company decides whether to outsource a fund, a fund family complex with more than one advisor (or affiliated sub-advisor) might allocate their funds to other advisors without hiring an external company. For instance, if an advisor is not an expert in a given style, but another advisor (or affiliated sub-advisor) in the same family is, then this fund would be allocated to an affiliated firm but not be considered management outsourcing per se. This could be easily the case because, in our sample, 34% of families have more than one principal advisor. Therefore, we also measure the core competency by fund family expertise rather than principal advisor expertise.[41]

Table 3 presents the estimates of the logistic model [2] for each fund in our sample belonging to one of four asset classes. Each column reports coefficients, t-statistics, marginal effects and standard deviations of the variables. According our first hypothesis, the expected sign of *Class Adv Expertise*, our expertise variable for the advisor in each asset class, should

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We also measured expertise in absolute terms (advisor TNA managed on the given style), and main results are unchanged.

[40] We apply the Petersen (2009) approach to estimate the standard errors of our regression efficiently. The SEs clustered by fund are dramatically larger than the white SEs, while the SEs clustered by year are only slightly larger than the white SE. Clustering by fund and year produces similar results to clustering only by fund. Therefore, the importance of time (after including dummies) is small, and, in the presence of a fund effect, White and Fama-MacBeth SEs are significantly biased.

[41] The main results remain unchanged. These tables are available upon request.

be negative to indicate that higher advisor expertise decreases the probability of the fund being outsourced. Our results confirm this negative relationship in all cases. For instance, for the equity funds group, the marginal effect is -0.213, which suggests that an increase of one standard deviation (STD) in the expertise of the equity funds advisor (0.344) decreases the likelihood of equity funds being outsourced by 7.3% (0.213*0.344). The baseline predicted probability (the unconditional probability) that an equity fund is outsourced is 14.5%, suggesting that equity funds managed by advisors with one STD less of equity expertise (-0.344*-0.213/0.145) are approximately 50.5% more likely to be outsourced than other funds.[42] Similarly, debt, balance and international funds with principal advisors less experienced (one STD lower) in each asset class are 30.4%, 83.4% and 83.5% more likely to be outsourced than other funds in their asset class, respectively. Our results indicate that the control variables size and expense ratio are positively related to outsourcing, while the number of funds of the principal advisor and the number of years the fund has been offered are negatively related to outsourcing.

Table 4 shows advisor expertise is negatively related to outsourced funds and statistically significant at the 1% level across the seven equity and debt investment styles. Greater advisor expertise in some styles or asset classes reduces the likelihood that a fund of that objective/class is outsourced to an unaffiliated company. Specifically, for equity funds (objectives (1) to (4) in Table 4), a one STD increase in expertise decreases the likelihood of being outsourced by 7.8% to 11.8%, depending on the objective. Additionally, with an increase of one STD in advisor expertise, the fund is approximately 60.8% to 79.6% less likely to be outsourced than other funds with the same investment objective. Additionally, an increase of one STD in advisor expertise decreases the likelihood of being outsourced by 2.1%, 2.9% and 7% for government short-term, government long-term and corporate funds, respectively, whereas when we consider the baseline probability that a fund of a specific style is outsourced, this increased expertise makes funds 36%, 40% and 54%, respectively, less likely to be outsourced than other funds.

[42] Our results are consistent with Cashman and Deli (2010), who find that although equity funds are more likely to be outsourced, when the advisor concentrates on managing equity funds, the likelihood of sub-advising decreases.

TABLE 3: ASSET CLASS ADVISOR EXPERTISE

Table 3 presents the results of a cross-sectional time series logistic regression model [2] of the probability of a fund being selected for outsourcing to an unaffiliated company. The sample contains all U.S. mutual funds from 1996 to 2011 classified by their asset class. The dependent variable is an indicator variable of whether the fund has been outsourced. *Class Adv Expertise* measures the expertise of the advisor in each asset class computed as the ratio of Advisor TNA on a fund's asset class over all Advisor TNA. *Fund Size* is the natural logarithm of the total net assets (TNA) under management in millions of dollars. *Advisor Size* is the logarithm of all the advisor's fund TNA, excluding the fund itself. *Advisor Funds* is the natural logarithm of the number of funds in that advisor, excluding the fund itself. *Fund Age* is the number of years since the fund's inception. *Fund Turnover* is the minimum of aggregate purchases and sales of securities divided by the average TNA over the calendar year. *Fund Expenses* are the total annual expenses and fees dividend by the year-end TNA. *Fund Flows* represents the new inflows of the fund over the previous year. *Past Return* is the cumulative past year's fund return. Control variables are lagged by one year. The constant term has been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) Equity Funds		(2) Debt Funds		(3) Balance Funds		(4) International Funds	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
Class Adv Expertise	-2.723***	-0.213***	-2.168***	-0.076***	-10.930**	-0.338**	-7.512***	-0.431***
	(-18.476)	0.344	(-9.063)	0.324	(-2.376)	0.284	(-9.944)	0.374
Fund Size	0.110***	0.009***	0.155***	0.005***	0.452***	0.014***	0.185***	0.011***
	(4.057)	2.182	(3.136)	1.928	(3.315)	2.198	(2.972)	2.167
Advisor Size	0.004	0.000	0.096*	0.003*	-0.169	-0.005	-0.171**	-0.010**
	(0.152)	3.463	(1.837)	2.646	(-1.199)	3.001	(-1.970)	3.429
Advisor Funds	-0.883***	-0.069***	-1.182***	-0.042***	-0.887***	-0.027***	-1.231***	-0.071***
	(-11.902)	1.485	(-10.005)	1.212	(-3.256)	1.333	(-6.669)	1.494
Fund Age	-0.031***	-0.002***	-0.046***	-0.002***	-0.005	-0.000	-0.029*	-0.002*
	(-3.522)	10.203	(-3.276)	7.091	(-0.411)	11.729	(-1.707)	6.232
Fund Turnover	-0.007	-0.001	0.106***	0.004***	0.184*	0.006*	0.078*	0.004*
	(-0.419)	2.248	(2.767)	1.872	(1.753)	0.871	(1.945)	1.826
Fund Expenses	0.355***	0.028***	0.287*	0.010*	0.911***	0.028***	0.252	0.014
	(4.129)	0.549	(1.688)	0.422	(3.424)	0.556	(1.358)	0.582
Fund Flows	0.004	0.000	0.009	0.000	-0.005	-0.000	-0.010	-0.001
	(0.528)	2.621	(0.474)	2.043	(-0.119)	1.606	(-0.348)	2.062
Past Return	-0.284	-0.022	-0.398	-0.014	3.100**	0.096**	0.384	0.022
	(-1.313)	0.199	(-0.456)	0.051	(2.134)	0.108	(1.144)	0.233
Observations	16947		12229		1995		4818	
Pseudo R2	0.236		0.278		0.341		0.535	
Baseline predicted probability	0.145		0.081		0.115		0.193	
Time dummies	Yes		Yes		Yes		Yes	

TABLE 4: INVESTMENT OBJECTIVE ADVISOR EXPERTISE

Table 4 presents the results of cross-sectional time series logistic regression model [2] of the probability of a fund being outsourced to an unaffiliated company. The sample contains U.S. equity and debt mutual funds from 1996 to 2011 classified by their investment objectives. The dependent variable is an indicator variable for whether the fund has been outsourced. *Objective Adv Expertise* measures advisor expertise in terms of investment objective computed as the ratio of Advisor TNA on the fund's objective over all Advisor TNA. *Fund Size* is the natural logarithm of the total net assets (TNA) under management in millions of dollars. *Advisor Size* is the logarithm of all the advisor's fund TNA, excluding the fund itself. *Advisor Funds* is the natural logarithm of the number of funds in that advisor, excluding the fund itself. *Fund Age* is the number of years since the fund's inception. *Fund Turnover* is the minimum of aggregate purchases and sales of securities divided by the average TNA over the calendar year. *Fund Expenses* is the total annual expenses and fees dividend by the year-end TNA. *Fund Flows* represents the new inflows of the fund over the previous year. *Past Return* is the cumulative past year's fund return. Control variables are lagged by one year. The constant term has been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) Capital Funds		(2) Growth Funds		(3) Income Funds		(4) Return Funds		(5) Gov ST Funds		(6) Gov LT Funds		(7) Corporate Funds	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
Objective Adv Expertise	-5.022***	-0.324***	-4.385***	-0.256***	-7.363***	-0.242***	-6.436***	-0.277***	-4.850***	-0.060***	-3.058***	-0.088***	-15.925***	-0.268***
	(-16.54)	0.364	(-10.58)	0.342	(-3.991)	0.322	(-7.364)	0.380	(-4.960)	0.356	(-5.495)	0.325	(-3.867)	0.262
Fund Size	0.213***	0.014***	0.138***	0.008***	0.396***	0.013***	0.203**	0.009**	0.446***	0.006***	0.254***	0.007***	0.394***	0.007***
	(4.893)	2.094	(2.605)	2.190	(3.524)	2.299	(2.303)	2.227	(2.597)	2.044	(3.914)	1.890	(2.839)	1.950
Advisor Size	-0.081	-0.005	-0.137**	-0.008**	-0.284**	-0.009**	-0.478***	-0.021***	-0.080	-0.001	-0.057	-0.002	-0.240	-0.004
	(-1.572)	3.489	(-2.068)	3.324	(-2.545)	3.351	(-3.287)	3.776	(-0.450)	2.653	(-0.753)	2.565	(-1.247)	2.968
Advisor Funds	-0.951***	-0.061***	-0.888***	-0.052***	-0.618***	-0.020***	-0.626**	-0.027**	-1.219***	-0.015***	-1.045***	-0.030***	-1.361***	-0.023***
	(-8.169)	1.512	(-5.813)	1.433	(-3.006)	1.417	(-2.271)	1.570	(-3.078)	1.191	(-7.376)	1.185	(-4.189)	1.281
Fund Age	-0.033**	-0.002**	-0.050***	-0.003***	-0.015	-0.000	0.007	0.000	-0.046	-0.001	-0.035**	-0.001**	-0.063*	-0.001*
	(-2.186)	7.943	(-3.409)	10.990	(-0.905)	15.326	(0.268)	7.520	(-1.368)	6.277	(-2.039)	6.557	(-1.955)	9.360
Fund Turnover	0.022	0.001	-0.067	-0.004	-0.029	-0.001	0.007	0.000	0.112	0.001	0.137**	0.004**	0.271***	0.005***
	(1.038)	2.729	(-1.426)	1.425	(-0.384)	1.034	(0.428)	2.553	(1.091)	1.810	(2.466)	1.859	(4.055)	1.947
Fund Expenses	0.217	0.014	0.471**	0.027**	0.492*	0.016*	0.274	0.012	0.969	0.012	0.551**	0.016**	0.016	0.000
	(1.446)	0.542	(2.520)	0.526	(1.934)	0.505	(1.033)	0.595	(1.252)	0.382	(2.468)	0.416	(0.053)	0.425
Fund Flows	0.023	0.001	-0.004	-0.000	-0.079*	-0.003*	0.017	0.001	-0.320	-0.004	0.025	0.001	0.060***	0.001***
	(1.098)	1.976	(-0.169)	2.124	(-1.713)	4.302	(1.423)	3.331	(-0.987)	2.430	(1.606)	1.709	(3.180)	3.112
Past Return	-0.253	-0.016	-0.282	-0.016	-0.699	-0.023	1.139	0.049	-1.351	-0.017	-0.565	-0.016	-0.265	-0.004
	(-0.815)	0.214	(-0.578)	0.201	(-0.643)	0.156	(1.337)	0.169	(-0.421)	0.068	(-0.479)	0.044	(-0.161)	0.069
Observations	8288		4542		2410		1707		693		9472		1986	
Pseudo R2	0.359		0.337		0.343		0.487		0.391		0.290		0.502	
Baseline Predicted Probability	0.158		0.144		0.098		0.152		0.059		0.073		0.130	
Time dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	

As a robustness check of the relationship between core competency and outsourcing, we conduct several additional tests. In particular, to assess the overall effect of expertise on outsourcing, we estimate equation [1] for the entire sample instead of using different regressions for each fund class and objective subsample. The results presented in Table 5 exhibit the same overall pattern, that is, funds within the core competency of their principal advisors are less likely to be outsourced. Because portfolio management outsourcing decisions are made at the family level, they might be driven by unobservable characteristics of families. Models (3) and (4) in Table 5 repeat the prior analysis, adding fund family fixed effects that allows us to compare differences in the effect of expertise on outsourcing decisions within the same firm. Again, advisor expertise is negatively related to portfolio management outsourcing.

Next, we consider whether advisor expertise affects outsourcing decisions in a linear manner. In particular, we compute two dummy variables, high and low, that equal 1 if the advisor expertise is at the 5^{th} or 1^{st} quintile, respectively. While the highest quintile of expertise makes funds 62.5% (for asset class) and 70% (for investment objective) less likely to be outsourced, the lowest quintile makes these funds 82% (for asset class) and 90% (for investment objective) more likely to be outsourced. We also observe that the probability of a fund being outsourced when the advisor possesses a low level of expertise is higher than the probability of in-house management when advisor is experience is high. This pattern may occur because other factors affect outsourcing a portfolio besides the core competency, such as past commercial relationships. Overall, these results suggest that the core competency of the principal advisors matters and that this effect is robust to different approaches. In particular, management companies base their outsourcing decisions on advisor expertise, outsourcing those funds in which they are less experienced. These results are consistent with Sigglekow (2003), who finds that fund families often lack the expertise to hire and evaluate managers beyond their core styles.

TABLE 5: CORE COMPETENCY AND ADVISOR EXPERTISE

Table 5 presents the results of cross-sectional time series logistic regression models of the probability of a fund being selected for outsourcing to an unaffiliated company. The sample contains all U.S. mutual funds from 1996 to 2011. The dependent variable is an indicator variable for whether the fund has been selected to be subadvised. Explanatory variables are *Class Adv Expertise* and *Objective Adv Expertise*, which measure advisor expertise in terms of asset class (ratio of Advisor TNA on fund's asset class over all Advisor TNA) and investment objective (ratio of Advisor TNA on fund's investment objective over all Advisor TNA), respectively. The control variables are defined in previous tables. Control variables are lagged by one year. The constant term has been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1)		(2)		(3)		(4)	
	All Funds-Asset Class		All Funds-Investment Objective		All Funds-Asset Class		All Funds-Investment Objective	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
Class Adv Expertise	-2.933***	-0.174***			-2.722***	-0.088***		
	(-25.036)	0.359			(-7.362)	0.353		
Objective Adv Expertise			-4.630***	-0.207***			-3.742***	-0.096***
			(-20.621)	0.346			(-4.096)	0.335
Fund Size	0.117***	0.007***	0.227***	0.010***	0.059	0.002	0.080*	0.002*
	(5.714)	2.099	(8.563)	2.081	(1.524)	2.092	(1.780)	2.077
Advisor Size	-0.100	-0.003	-0.119***	-0.005***	0.192**	0.006**	0.136	0.004
	(-0.015)	3.209	(-3.667)	3.183	(2.407)	3.124	(1.252)	3.075
Advisor Funds	-0.970***	-0.058***	-0.938***	-0.042***	-1.849***	-0.060***	-1.823***	-0.047***
	(-17.799)	1.407	(-13.686)	1.394	(-9.923)	1.405	(-8.569)	1.381
Fund Age	-0.029***	-0.002***	-0.035***	-0.002***	-0.014	-0.000	-0.015	-0.000
	(-4.697)	8.912	(-4.498)	9.039	(-1.353)	8.619	(-1.165)	8.665
Fund Turnover	0.054***	0.003***	0.054***	0.002***	0.022	0.001	0.032	0.001
	(5.000)	2.015	(3.549)	2.099	(0.757)	2.225	(0.949)	2.351
Fund Expenses	0.289***	0.017***	0.419***	0.019***	0.670***	0.022***	0.853***	0.022***
	(4.701)	0.560	(5.295)	0.535	(3.479)	0.537	(3.414)	0.508
Fund Flows	0.004	0.000	0.005	0.000	0.017	0.001	0.028**	0.001**
	(0.547)	2.316	(0.822)	2.396	(1.444)	2.018	(2.027)	2.052
Past Return	-0.035	-0.002	0.038	0.002	0.218	0.007	0.309	0.008
	(-0.249)	0.166	(0.202)	0.155	(0.666)	0.163	(0.815)	0.152
Observations	36025		29204		21039		16147	
Pseudo R2	0.282		0.341		0.563		0.590	
Baseline predicted probability	0.128		0.118		0.184		0.179	
Time dummies	Yes		Yes		Yes		Yes	
Family F.E.	No		No		Yes		Yes	

TABLE 6: CORE COMPETENCY AND ADVISING

Table 6 presents the results of cross-sectional time series logistic regression models of the probability of a fund being selected for outsourcing to an unaffiliated company. The sample contains all U.S. mutual funds from 1996 to 2011. The dependent variable is an indicator variable for whether the fund has been selected to be subadvised. The main explanatory variables are *High Class Adv Expertise*, *Low Class Adv Expertise*, *High Objective Adv Expertise* and *Low Objective Adv Expertise*, which are indicator variables that equal 1 if the advisor expertise is in the fifth (high) or first (low) quintile in terms of asset class (ratio of Advisor TNA on fund's asset class over all Advisor TNA) and investment objective (ratio of Advisor TNA on fund's investment objective over all Advisor TNA), respectively. The control variables have ben previously defined. Control variables are lagged by one year. The constant term has been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) All Funds-Asset Class		(2) All Funds-Investment Objective	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std
High Class Adv Expertise	-1.322***	-0.080***		
	(-10.998)	0.382		
Low Class Adv Expertise	1.731***	0.105***		
	(24.860)	0.406		
High Objective Adv Expertise			-1.894***	-0.083***
			(-10.928)	0.371
Low Objective Adv Expertise			2.414***	0.106***
			(28.289)	0.399
Fund Size	0.108***	0.007***	0.227***	0.010***
	(5.397)	2.099	(8.659)	2.081
Advisor Size	-0.014	-0.001	-0.099***	-0.004***
	(-0.643)	3.209	(-3.283)	3.183
Advisor Funds	-0.926***	-0.056***	-0.832***	-0.036***
	(-16.361)	1.407	(-12.686)	1.394
Fund Age	-0.029***	-0.002***	-0.034***	-0.001***
	(-4.720)	8.912	(-4.431)	9.039
Fund Turnover	0.052***	0.003***	0.053***	0.002***
	(4.680)	2.015	(4.360)	2.099
Fund Expenses	0.251***	0.015***	0.385***	0.017***
	(4.069)	0.560	(4.996)	0.535
Fund Flows	0.004	0.000	0.005	0.000
	(0.532)	2.316	(0.686)	2.396
Past Return	-0.064	-0.004	0.097	0.004
	(-0.455)	0.166	(0.501)	0.155
Observations	36025		29204	
Pseudo R2	0.283		0.360	
Baseline predicted probability	0.128		0.118	
Time dummies	Yes		Yes	

4.2 Sub-advisor Expertise and Selection

In this section, we test whether outsourced funds are more likely to be managed by experienced subadvisors. Sub-advisor expertise is measured as the concentration of assets managed in a fund style.[43] We estimate the following cross-sectional logistic regression specification for all sub-advised U.S. mutual funds in our dataset across the period 1996-2011 on a yearly basis:

$$Prob(z_{i,t} = 1) = \frac{\exp(\beta_j z_i)}{1+\exp(\beta_j z_i)} \qquad \text{for } s \in S, \qquad [4]$$

where $\beta_j z_i = (\beta_0 + \beta_1 E_{i,t} + \beta_2 x_{i,t-1} + \delta_t + \varepsilon_{it})$. The dependent variable $z_{i,t,s}$ is a dummy that takes the value 1 if the sub-advised fund *i* belongs to style *s* in year *t* and 0 otherwise. β_0 represents the constant term, and $E_{i,t}$ is the main variable of interest, defined as subadvisor expertise in a specific style. Thus, β_1 will capture how subadvisor expertise for a given style affects the probability that this subadvisor manages an external fund in that style. For example, a positive β_1 for equity expertise means that a subadvisor with higher experience is more likely to manage an equity fund than a fund of any other asset class. Further control variables at the sub-advisor level include sub-advisor size, measured as the logarithm of all funds' TNA of the sub-advisor excluding the fund itself, and sub-advisor funds, measured as the natural logarithm of the number of funds in that sub-advisor excluding the fund itself.

Note that by estimating [4], we do not consider causality between subadvisor expertise and fund style but simple correlation controlling for other factors. Consequently, this approach allows us to examine whether subadvisor expertise in a given style is related to the style of the fund selected for outsourcing and whether that management company will allocate outsourced funds to highly experienced subadvisors.

Sub-advisor expertise measured at the asset class level seems relevant to the sub-advisor choice, as illustrated in model (1) of Table 7. A one STD increase in sub-advisor expertise for

[43] Note that, as in principal advisor expertise, to properly assess sub-advisor expertise, we consider assets from their own internal funds and discount any assets from funds the sub-advisor has outsourced to a different company.

equity funds increases the likelihood that the fund managed by that sub-advisor is equity by 52%. These sub-advisors are twice as likely to be assigned to equity funds as other sub-advisors. The results are similar across categories (models (2), (3) and (4)), indicating that sub-advisors with expertise one STD higher are 62.4%, 46% and 90% more likely to be assigned to debt, balance and international funds, respectively, than to other sub-advised funds.

Overall, the results presented in Table 8 highlight the importance of sub-advisor expertise on a given investment objective when management companies hire an unaffiliated firm to manage their outsourced equity funds. For instance, model 1 indicates that a sub-advisor with one STD more capital expertise is approximately 107.4% more likely to be assigned a capital fund than other equity funds. Similarly, under an equivalent increase in expertise, the sub-advisor is 63%, 20.7% or 40.9% more likely to manage a growth, income or total return fund, respectively. These findings remain unchanged when we examine debt funds, and the results are similar across the three models presented. An increase of one STD in sub-advisor expertise in Gov ST, Gov LT or Corporate makes the sub-advisor 3.4%, 38.5% and 30.2% more likely to manage Gov ST, Gov LT or Corporate debt funds, respectively, than other debt funds.

By testing the second part of our first hypothesis, we realize that although the results are similar across all categories, the magnitude of the effect of expertise on the investment objective of the fund outsourced varies by specification. In particular, we observe that for both asset classes, sub-advisor expertise has a stronger effect on riskier investment objectives, that is, capital appreciation and growth for equity funds and government long-term and corporate for debt funds. One interpretation of this result is provided in the Descriptive Appendix. Capital appreciation funds that invest in high-risk securities or growth funds with a moderate degree of risk are more difficult to price than other less risky funds and, therefore, might require managers who are more experienced. Similarly, assets from long-term government and corporate funds are more difficult to price than short-term government securities, especially corporate debt assets that might carry default risk.

TABLE 7: ASSET CLASS EXPERTISE AND SUBADVISOR CHOICE

Table 7 presents the results of cross-sectional time series logistic regression models of the probability of a fund belonging to one of four asset class categories. For the 4 models, the sample contains all U.S. outsourced mutual funds from 1996 to 2011, or 5644 observations. The dependent variable is an indicator variable of whether the subadvised fund belongs to the equity, debt, balance or international class in each three-column panel. The explanatory variables are *Class Sub Expertise*, which measures subadvisor expertise (ratio of Subdvisor TNA on a particular asset class over all Subadvisor TNA) in a specific asset class. For example, column (1) measures subadvisor expertise in the equity asset class. *Fund Size* is the natural logarithm of the total net assets (TNA) under management in millions of dollars. *Subadvisor size* is the logarithm of all the subadvisor's fund TNA, excluding the fund itself. *Subadvisor Funds* is the natural logarithm of the number of funds in that subadvisor, excluding the fund itself. *Fund Age* is the number of years since the fund inception. *Fund Turnover* is the minimum of aggregate purchases and sales of securities divided by the average TNA over the calendar year. *Fund Expenses* are the total annual expenses and fees dividend by the year-end TNA. *Fund Flows* represents the new inflows of the fund over the previous year. *Past Return* is the cumulative past years' fund return. Control variables are lagged one year. The constant term has been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) Subadvised Funds (Equity)		(2) Subadvised Funds (Debt)		(3) Subadvised Funds (Balance)		(4) Subadvised Funds (International)	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
Class Sub Expertise	4.940***	1.229***	5.234***	0.389***	7.127***	0.158***	7.043***	0.503***
	(30.876)	0.424	(23.189)	0.366	(14.763)	0.151	(27.470)	0.326
Fund Size	0.098**	0.024**	-0.216***	-0.016***	-0.150**	-0.003**	0.087*	0.006*
	(2.411)	1.948	(-4.158)	1.948	(-2.113)	1.948	(1.690)	1.948
Subadvisor Size	-0.041	-0.010	0.042	0.003	0.187*	0.004*	0.165***	0.012***
	(-0.713)	3.776	(0.579)	3.776	(1.859)	3.774	(2.745)	3.776
Subadvisor Funds	0.217	0.054	-0.018	-0.001	-0.086	-0.002	0.158	0.011
	(1.424)	1.344	(-0.094)	1.344	(-0.340)	1.344	(1.030)	1.344
Fund Age	-0.023*	-0.006*	0.029**	0.002**	0.045***	0.001***	-0.007	-0.001
	(-1.657)	7.466	(1.978)	7.466	(3.473)	7.463	(-0.577)	7.466
Fund Turnover	-0.111***	-0.028***	-0.020	-0.001	-0.032	-0.001	0.040**	0.003**
	(-3.446)	2.093	(-0.851)	2.093	(-0.542)	2.094	(2.277)	2.093
Fund Expenses	0.642***	0.160***	-2.319***	-0.172***	-0.365	-0.008	1.001***	0.071***
	(4.496)	0.557	(-9.592)	0.557	(-1.118)	0.557	(4.249)	0.557
Fund Flows	-0.018	-0.005	0.039***	0.003***	-0.098	-0.002	-0.002	-0.000
	(-1.473)	2.585	(3.080)	2.585	(-1.250)	2.586	(-0.132)	2.585
Past Performance	-0.719**	-0.179**	-0.066	-0.005	-0.400	-0.009	1.580***	0.113***
	(-2.361)	0.174	(-0.179)	0.174	(-0.839)	0.174	(3.919)	0.174
Observations	5644		5644		5644		5644	
Pseudo R2	0.471		0.582		0.368		0.586	
Baseline predicted probability	0.518		0.228		0.052		0.182	
Time dummies	Yes		Yes		Yes		Yes	

TABLE 8: INVESTMENT OBJECTIVE EXPERTISE AND SUBADVISOR CHOICE

Table 8 presents the results of cross-sectional time series logistic regression models of the probability of a fund being one of seven equity and debt investment objective categories. The sample contains the equity and debt U.S. outsourced mutual funds from 1996 to 2011. The dependent variable is an indicator variable for whether the equity subadvised fund belongs to capital, growth, income, return, government short term, government long term or corporate bond investment objective in each two-column panel. The explanatory variables include *Objec Sub Expertise*, which measures subadvisor expertise (ratio of Subdvisor TNA on a particular investment objective over all Subadvisor TNA) in a specific investment objective in each column (for example, for column (1), the variable measures subadvisor expertise in capital investment). The set of control variables is defined in previous tables. The constant term has been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) Subadvised Funds (Capital)		(2) Subadvised Funds (Growth)		(3) Subadvised Funds (Income)		(4) Subadvised Funds (Return)		(5) Subadvised Funds (Gov ST)		(6) Subadvised Funds (Gov LT)		(7) Subadvised Funds (Corporate)	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
Objec Sub Expertise	5.292***	0.816***	5.534***	0.370***	6.810***	0.102***	7.586***	0.105***	6.172***	0.009***	5.980***	0.257***	6.581***	0.116***
	(27.884)	0.354	(24.417)	0.287	(15.423)	0.164	(19.217)	0.191	(6.684)	0.153	(18.119)	0.286	(16.074)	0.177
Fund Size	0.028	0.004	0.042	0.003	0.103	0.002	-0.035	-0.000	0.045	0.000	-0.241***	-0.010***	-0.133*	-0.002*
	(0.661)	1.948	(0.910)	1.948	(1.106)	1.948	(-0.442)	1.948	(0.384)	1.971	(-4.663)	1.948	(-1.653)	1.948
Subadvisor Size	0.168***	0.026***	-0.052	-0.003	-0.090	-0.001	0.018	0.000	-0.048	-0.000	0.034	0.001	0.125	0.002
	(3.319)	3.776	(-0.780)	3.776	(-0.966)	3.774	(0.168)	3.774	(-0.331)	3.800	(0.526)	3.776	(1.241)	3.774
Subadvisor Funds	-0.080	-0.012	0.322*	0.022*	0.674***	0.010***	0.243	0.003	0.129	0.000	0.375**	0.016**	-0.061	-0.001
	(-0.600)	1.344	(1.779)	1.344	(2.740)	1.344	(0.839)	1.344	(0.264)	1.348	(2.192)	1.344	(-0.235)	1.344
Fund Age	-0.023	-0.004	-0.028*	-0.002*	0.022	0.000	0.010	0.000	0.038**	0.000**	0.044***	0.002***	-0.032	-0.001
	(-1.460)	7.466	(-1.840)	7.466	(1.563)	7.463	(0.513)	7.463	(2.424)	7.434	(3.580)	7.466	(-1.575)	7.463
Fund Turnover	-0.038	-0.006	-0.082	-0.006	-0.614***	-0.009***	-0.397*	-0.005*	0.070***	0.000***	-0.033	-0.001	-0.073	-0.001
	(-1.461)	2.093	(-1.509)	2.093	(-3.401)	2.094	(-1.943)	2.094	(2.711)	2.233	(-1.389)	2.093	(-1.372)	2.094
Fund Expenses	0.414***	0.064***	0.408***	0.027***	0.037	0.001	0.046	0.001	-1.520**	-0.002**	-2.344***	-0.101***	-1.708***	-0.030***
	(2.668)	0.557	(2.821)	0.557	(0.145)	0.557	(0.108)	0.557	(-2.386)	0.557	(-8.975)	0.557	(-6.207)	0.557
Fund Flows	-0.032**	-0.005**	-0.006	-0.000	-0.090*	-0.001*	0.035**	0.000**	0.059	0.000	-0.025	-0.001	0.043***	0.001***
	(-2.124)	2.585	(-0.298)	2.585	(-1.759)	2.586	(2.007)	2.586	(1.222)	2.599	(-0.706)	2.585	(3.035)	2.586
Past Return	-0.621*	-0.096*	-0.649	-0.043	0.187	0.003	0.385	0.005	-4.569***	-0.007***	-0.223	-0.010	0.898**	0.016**
	(-1.776)	0.174	(-1.331)	0.174	(0.303)	0.174	(0.547)	0.174	(-3.069)	0.171	(-0.580)	0.174	(2.237)	0.174
Observations	5644		5644		5644		5644		5644		5644		5644	
Pseudo R2	0.422		0.451		0.412		0.573		0.492		0.561		0.423	
Baseline predicted probability	0.269		0.167		0.081		0.049		0.040		0.191		0.068	
Time dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	

As an additional check, we examine whether high and low levels of sub-advisor expertise and affect fund style allocation equivalently. We observe mixed evidence. While the positive impact of high expertise in equity funds is stronger than the negative impact of low expertise, for debt and international funds, low levels of expertise exert greater effects than high levels. When expertise is measured in terms of investment objectives, except for capital appreciation and government short-term debt funds (which appear to exhibit a linear relation), low levels of expertise have a stronger negative impact than the positive effect of high levels. Overall, these results suggest that while experience positively affects the allocation of a fund, a lack of expertise in a given style is more heavily penalized, which makes the allocation of those funds to a sub-advisor highly unlikely, providing more evidence of the importance of the core competency. [44]

5. Core competency and fund performance

5.1.Subadvisor Expertise and Fund Performance

Next, we investigate whether the level of sub-advisor specialization in the fund asset class or investment objective affects fund performance. Tables 9 and 10 report the pooled OLS estimates of the following equation:

$$\alpha_{it} = \beta_0 + \beta_1 Sub_{it} + \beta_2 Sub\ Expertise_{it} + \beta_3 X_{it-12} + \theta_s + \delta_t + \varepsilon_{it}, \qquad [5]$$

where α_{it} is the alpha of fund *i* in month *t* adjusted by different risk factors. β_0 is the intercept of the model. Sub_{it} is a dummy variable indicating whether fund *i* was sub-advised in month *t*. $Sub\ Expertise_{it}$ is defined as subadvisor expertise and measures the proportion of fund TNA the subadvisor has in fund *i*'s style with respect to the general TNA of that sub-advisor. X_{it-12} is a set of control variables as previously defined.[45] θ_s is a set of dummy variables for each

[44] To save space, we do not report these tables, but they are available upon request.
[45] Note that, unlike prior measures of expertise and control variables, these variables are defined on a monthly rather than annual basis.

fund style *s*, δ_t is the time fixed effect for each period *t*, and ε_{it} is an error term that is uncorrelated with all other independent variables. By including these dummy variables, we allow the coefficient of the subadvised fund to measure the effect of external firm outsourcing on fund performance relative to other funds in the same period and within the same style. We also cluster the standard errors to allow correlation of the error term of each fund over time.

To analyze performance, we utilize monthly fund returns from CRSP and convert all variables extracted from NSAR-B filings into monthly data. We conduct a regular analysis of all U.S. open-ended mutual funds from our sample (from 1996 to 2011). Following prior research, we use the four-factor model developed by Carhart (1997) to estimate the abnormal returns, where the fund's alpha, α_i, captures the fund's before-fee risk-adjusted performance.[46] As a robustness check, we also consider the CAPM and Fama-French (1993) three-factor models. Because we also consider international, balance and fixed income funds, we use two additional performance models. The first is a four-factor model (Carhart 1997) augmented by the MSCI World Index and U.S. Aggregate Bond Index returns in excess of the risk-free rate. The second model is a 9-Factor model, which includes the four-factor model (Carhart 1997) and the following five additional risk factors: Barclays US Treasury Bill 1-3 Months, Barclays US Treasury 1-3 Years, Barclays US Government Long, U.S. Corporate High-Yield and U.S. Corporate AAA. For every month from 1996 to 2011, we regress fund gross excess returns (before expenses and subtracting the risk-free rate) on the risk factors over the previous 24 months (which requires a minimum of 20 observations).[47]

The estimates presented in Table 9 are similar across all models. Several conclusions can be drawn about the importance of sub-advisor core competency on the performance of outsourced funds. First, as illustrated in Table 9, the coefficient of *Subadvised* is negative and statistically significant at the 1% level. This result is consistent with prior research that indicates the underperformance of outsourced funds. In particular, a sub-advised fund underperforms by an average of 23 to 58 bps per year compared to their in-house managed

[46] The data for the Fama-French and momentum factors were obtained from the Kenneth French website.
[47] The main results remain unchanged when using a wider window of 36 months instead of 24 to estimate fund performance.

peers, depending on the performance measure. We hypothesize that expertise positively affects performance, and thus, outsourced funds gain from being managed by highly experienced sub-advisors. An outsourced fund managed by a sub-advisor who manages only funds of a given asset class outperform those managed by inexperienced managers by 35 to 52 bps per year. Overall, being managed by a fully experienced sub-advisor is insufficient for funds to outperform their in-house managed peers. However, this difference helps offset the underperformance of outsourced funds that prior research attributed as being due to firm boundaries (Chen *et al.* 2013) or conflicts of interest (Chuprinin *et al.* 2013, Moreno *et al.* 2012).

Table 10 presents the repeated performance analysis by investment objective rather than asset class expertise. As in Table 9, the sub-advised coefficient is negative and statistically significant, while expertise in a particular investment objective positively affects performance. A sub-advised fund, on average, underperforms by 32 to 59 bps per year compared to their in-house managed peers, but an outsourced fund managed by a sub-advisor that exclusively manages a given objective outperforms inexperienced managers by 34 to 100 bps per year.[48]

5.2.The efficiency of portfolio management outsourcing

In this section, we address the consequences for advisory companies and in-house funds of outsourcing the portfolio management of some funds. Prior research has demonstrated that outsourced funds underperform their in-house peers due to firm boundaries (Chen et al., 2013) or conflicts of interest within management companies that tend to favor their internal funds (Chuprinin et al., 2012, Duong 2010, and Moreno et al., 2012). However, some authors claim that the efficiency of these outsourcing agreements depends on the underlying economics need to externalize such tasks (Cashman and Deli, 2009) or when certain mechanisms are specified in the sub-advisory contract (Moreno et al., 2012). Moreover, the literature on organizational theory suggest that allowing outside specialist organizations to concentrate on certain tasks

[48] The results reported so far do not vary because the core competency (or experience) is defined by asset classes or investment objectives. To save space, we will utilize only the definitions of asset classes.

increases firm performance by allowing them to focus on the tasks they perform best (Quinn (1992), Quinn and Hilmer, 1994; Ellram and Billington, 2001). We hypothesize that internal funds should have a positive impact on performance after a company outsources a high proportion of the funds they were managing.

TABLE 9: SUBADVISOR CLASS EXPERTISE AND FUND PERFORMANCE

Table 9 presents the results of the monthly panel regressions of risk-adjusted returns on fund characteristics. The sample contains all U.S. mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by the alpha from CAPM, Fama-French three factors (FF3), Carhart's 4 factors (FF4) model, te Carhart's model augmented by an international index and a global bond index (FF6) and Carhart's model augmented by 3 government bond indexes and 2 corporate indexes (FF9). Subadvised is a dummy variable that equals 1 if the fund is subadvised to an unaffiliated firm. Class Sub Expertise measures the subadvisor expertise in terms of fund asset class (ratio of Subadvisor TNA on fund's asset class over all Subadvisor TNA). Fund Size is the natural logarithm of the total net assets (TNA) under management in millions of dollars. Advisor size is the logarithm of all the advisor's fund TNA, excluding the fund itself. Advisor Funds is the natural logarithm of the number of funds in that advisor, excluding the fund itself. Subadvisor size is the logarithm of all funds TNA of the Subadvisor, excluding the fund itself. Subadvisor Funds is the natural logarithm of the number of funds in that Subadvisor, excluding the fund itself. Fund Age is the number of years since the fund inception. Fund Turnover is the minimum of aggregate purchases and sales of securities divided by the average TNA over the calendar year. Fund Expenses are the total annual expenses and fees dividend by the year-end TNA. Fund Flows represents the new inflows of the fund over the previous year. Past Return is the percentage of cumulative past years' fund return. Control variables are lagged 12 months. Time and investment objective dummies are included but not reported; the constant term has also been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) CAPM	**(2)** FF3	**(3)** FF4	**(4)** FF6	**(5)** FF9
Subadvised	-0.0381***	-0.0218**	-0.0193*	-0.0309***	-0.0483***
	(-2.82)	(-1.99)	(-1.78)	(-2.70)	(-3.51)
Class Sub Expertise	0.0380***	0.0416***	0.0434***	0.0295***	0.0339***
	(3.51)	(4.39)	(4.54)	(3.04)	(3.07)
Fund Size	-0.0005	0.0011	-0.0001	-0.0010	-0.0015
	(-0.16)	(0.40)	(-0.05)	(-0.36)	(-0.49)
Advisor Size	-0.0034	-0.0036	-0.0035	-0.0020	0.0041
	(-0.69)	(-0.90)	(-0.87)	(-0.44)	(0.79)
Advisor Funds	0.0487**	0.0692***	0.0801***	0.0526**	0.0312
	(2.02)	(3.44)	(4.07)	(2.53)	(1.37)
Subadvisor Size	0.0174***	0.0208***	0.0200***	0.0149***	0.0153**
	(2.87)	(4.09)	(3.96)	(2.68)	(2.39)
Subadvisor Funds	-0.0701***	-0.0871***	-0.0968***	-0.0684***	-0.0632***
	(-2.99)	(-4.39)	(-4.98)	(-3.30)	(-2.86)
Fund Age	0.0002	-0.0005	-0.0003	-0.0002	-0.0000
	(0.25)	(-1.11)	(-0.69)	(-0.48)	(-0.01)
Fund Expenses	0.0435**	0.0295**	0.0252*	0.0434***	0.0572***
	(2.40)	(2.06)	(1.73)	(3.27)	(3.98)

(Continued)

Fund Turnover	0.0021	0.0033	0.0052**	-0.0020	-0.0049*
	(0.94)	(1.43)	(2.07)	(-0.75)	(-1.81)
Fund Flows	0.0048***	0.0041***	0.0042***	0.0046***	0.0055***
	(3.74)	(4.08)	(4.18)	(4.60)	(4.22)
Past Return	0.0117***	0.0105***	0.0100***	0.0090***	0.0074***
	(34.51)	(35.39)	(34.71)	(29.24)	(18.79)
Observations	140155	140155	140155	140155	140155
Adjusted R^2	0.211	0.194	0.177	0.170	0.090
Time dummies	Yes	Yes	Yes	Yes	Yes
Investment Objective dummies	Yes	Yes	Yes	Yes	Yes

TABLE 10: SUBADVISOR OBJECTIVE EXPERTISE AND FUND PERFORMANCE

Table 10 presents the results of the monthly panel regressions of risk-adjusted returns on fund characteristics. The sample contains all U.S. mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by the alpha for CAPM, Fama-French three factors (FF3), Carhart's 4 factors (FF4) model, Carhart's model augmented by an international index and a global bond index (FF6) and Carhart's model augmented by 3 government bond indexes and 2 corporate indexes (FF9). Subadvised is a dummy variable that equals 1 if the fund is subadvised to an unaffiliated firm. Class Sub Expertise measures the subadvisor expertise in terms of fund asset class (ratio of Subadvisor TNA on fund's asset class over all Subadvisor TNA). Fund Size is the natural logarithm of the total net assets (TNA) under management in millions of dollars. Advisor size is the logarithm of all the advisor's fund TNA, excluding the fund itself. Advisor Funds is the natural logarithm of the number of funds in that advisor, excluding the fund itself. Subadvisor size is the logarithm of all funds TNA of the Subadvisor, excluding the fund itself. Subadvisor Funds is the natural logarithm of the number of funds in that Subadvisor, excluding the fund itself. Fund Age is the number of years since fund inception. Fund Turnover is the minimum of aggregate purchases and sales of securities divided by the average TNA over the calendar year. Fund Expenses are the total annual expenses and fees dividend by the year-end TNA. Fund Flows represents the new inflows of the fund over the previous year. Past Return is the percentage cumulative past year's fund return. Control variables are lagged by 12 months. Time and investment objective dummies are included but not reported; the constant term has also been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) CAPM	**(2)** FF3	**(3)** FF4	**(4)** FF6	**(5)** FF9
Subadvised	-0.0273*	-0.0306**	-0.0288**	-0.0493***	-0.0493***
	(-1.83)	(-2.48)	(-2.37)	(-3.83)	(-3.34)
Objective Sub Expertise	-0.0182	0.0417***	0.0465***	0.0834***	0.0284*
	(-1.12)	(3.19)	(3.66)	(6.11)	(1.81)
Fund Size	-0.0110***	-0.0092***	-0.0099***	-0.0057**	-0.0044
	(-3.19)	(-3.26)	(-3.57)	(-1.99)	(-1.40)
Advisor Size	-0.0098*	-0.0093**	-0.0083*	-0.0050	0.0021
	(-1.72)	(-2.02)	(-1.84)	(-1.05)	(0.38)
Advisor Funds	0.0526*	0.0815***	0.0929***	0.0707***	0.0358
	(1.93)	(3.65)	(4.30)	(3.18)	(1.49)
Subadvisor Size	0.0209***	0.0240***	0.0230***	0.0167***	0.0185***
	(3.04)	(4.23)	(4.14)	(2.89)	(2.78)
Subadvisor Funds	-0.0594**	-0.0831***	-0.0951***	-0.0786***	-0.0673***
	(-2.23)	(-3.75)	(-4.42)	(-3.54)	(-2.90)

(Continued)

Fund Age	0.0007	0.0004	0.0006	-0.0001	-0.0003
	(1.09)	(0.78)	(0.99)	(-0.23)	(-0.52)
Fund Expenses	-0.0343**	-0.0494***	-0.0509***	-0.0055	0.0327**
	(-2.01)	(-3.52)	(-3.63)	(-0.46)	(2.46)
Fund Turnover	0.0059**	0.0084***	0.0100***	-0.0009	-0.0027
	(2.38)	(3.45)	(3.79)	(-0.33)	(-1.02)
Fund Flows	0.0046***	0.0036***	0.0037***	0.0046***	0.0048***
	(3.36)	(3.59)	(3.69)	(4.29)	(3.63)
Past Return	1.2370***	1.0878***	1.0213***	0.9044***	0.7586***
	(30.22)	(31.48)	(31.33)	(26.99)	(17.55)
Observations	135790	135790	135790	135790	135790
Adjusted R^2	0.193	0.175	0.162	0.155	0.088
Time dummies	Yes	Yes	Yes	Yes	Yes
Investment Objective dummies	Yes	Yes	Yes	Yes	Yes

5.2.1 T-test analysis

To examine whether in-house funds benefit from the specialization of a management company that outsources many of its funds, we perform a t-test analysis to compare the overall performance of advisors who increase or decrease their proportion of outsourced funds. For an advisor, the proportion of outsourced funds is computed by dividing the number of outsourced funds and the number of total funds the advisor is currently offering. To consider different outsourcing policies, we adjust the ratio computing the percentage change with respect to the previous twelve months[49]. We select a twelve-month period because our sub-advisory contract data are provided on an annual basis. We can assume that there will be very few cases in which advisory contracts change more than once a year.

In Panel A of Table 11, we present a t-test analysis to compare differences in advisor performance for positive and negative changes in the proportion of outsourced funds during the previous year (the first row). The second row tests differences in performance between companies in the top decile (the highest increase in the proportion of outsourced funds) and the bottom decile (the largest decrease). The third and fourth rows consider only those outsourced funds that are not within the advisor's core competency, where the core competency of the advisor is defined by the maximum asset class expertise (simple majority)

[49] There might exist firms with non-outsourcing policies, others that have been outsourcing frequently, or even virtual families that only distribute funds and hire external firms to manage all their funds. To correct for these possibilities, we first exclude virtual families and then adjust the ratio by calculating the percentage change.

or at least 50% expertise (absolute majority). The advisor performance is measured as the TNA-weighted averages of the corresponding fund-level alpha from Carhart's model augmented by 3 government bond indexes and 2 corporate indexes (FF9). We use the fund alpha of in-house funds (first two columns), in-house funds within the simple majority core (3rd and 4th columns), and in-house funds within the absolute majority core (5th and 6th columns).

The results presented in the first two columns of Panel A indicate that the performance of in-house funds of advisory companies that increased the proportion of outsourced funds during the past twelve months (outsourcing firms hereafter) is approximately 23.7 bps higher per year than that of funds from advisory companies that increased the proportion of in-house funds (integrating firms hereafter). In the second row of Panel A, we examine the difference between the top and bottom deciles rather than simple positive and negative changes. The advisor performance of in-house funds that are within the core competency is approximately 80.5 bps per year higher for outsourcing firms than for integrating firms. We observe that such differences are systematically higher across the table. Thus, we argue that not only is the sign important but also the magnitude of such changes. When examining the difference between outsourcing and integrating firms of non-core funds, we find that the general advisor performance of the former is between 37 bps and 58 bps higher than that of integrating firms. To demonstrate the economic significance of these figures, we note that the average advisor performance is approximately 82.6 bps per year. Thus, by increasing the proportion of non-core outsourced funds, these firms experience performance gains of 43% to 63% over an average firm.

5.2.2 Propensity Score Matching

In-house funds from outsourcing firms might perform better because fund sub-advising affects other advisor characteristics that lead to higher efficiency. In this section, we employ a propensity score matching procedure using a nearest neighbor algorithm developed by Rosenbaum and Rubin (1983) and stratified sampling described by Hunt and Tyrrell (2001) to identify a control sample of integrating firms that exhibit no observable differences in

characteristics relative to outsourcing firms. Thus, each pair of matched advisors is similar, except for the main variable of interest: changes in the proportion of outsourced funds. We then compare the advisory performance (the alpha from the 9-factor model previously defined) of the two groups for any in-house managed funds and for funds managed in-house within the advisor's core competency. Because the control advisors are restricted to a set of peers who are similar in terms of observable characteristics, funds from outsourcing firms are expected to exhibit the same performance as funds from integrating firms. The same analysis with a similar intuition was conducted for a restricted group of funds that are managed by outsourcing firms that externalize the portfolio management of their non-core funds.

To implement this methodology, we first calculate the probability (i.e., the propensity score) that an advisor with particular characteristics is an outsourcing firm. The propensity score is calculated using advisor characteristics. Specifically, this probability is estimated as a function of the number of funds per advisor and total advisor size as well as age, turnover and expenses defined as the TNA-weighted averages of the corresponding fund-level measures. To ensure that the characteristics in the control sample (integrating firms) are sufficiently similar to those of outsourcing firms, we require that the maximum difference between the propensity score of these firms and that of its matching peer does not exceed 0.1% in absolute value.

Panel B of Table 11 compares the advisor performance of matched outsourcing and integrating firms and reports the value of the difference and significance level using bootstrapped standard errors. We observe that, independent of the type of funds managed and the approach used, the advisor performance of outsourcing firms is between 18 bps and 43 bps higher per year than that of integrating firms. When we restrict our analysis to only outsourcing firms that increased the proportion of non-core outsourced funds, the difference is as high as 66 bps per year. These results confirm that even when holding observable advisor characteristics of outsourcing and integrating firms constant, in-house funds of the former tend to be better managed than the latter.[50]

[50] These results are also robust to the use of radius and kernel matching methods.

TABLE 11. THE EFFICIENCY OF OUTSOURCING (I)

Panel A of Table 11 presents a t-test analysis of the differences in advisor performance between positive and negative changes in the proportion of the outsourced funds of a given advisor during the prior year (the first row). The second row test differences in performance between companies in the top decile (the highest increase in the proportion of outsourced funds) and the bottom decile (the largest drop). The third and fourth rows consider only outsourced funds that are not within the advisor's core competency, where the core competency of the advisor is defined by the maximum asset class expertise (simply majority) or at least 50% of expertise (absolute majority). The advisor performance is the TNA-weighted averages of the corresponding fund-level alpha from Carhart's model augmented by 3 government bond indexes and 2 corporate indexes (FF9). We use the fund alpha of in-house funds (first two columns), in-house funds within the simple majority core (3rd and 4th columns), and in-house funds within the absolute majority core (5th and 6th columns). In Panel B, we identify a treatment group of firms that increased the proportion of outsourced funds and a control sample of advisors employing two different propensity score matching procedures: a nearest neighbor algorithm by Rosenbaum and Rubin (1983) and stratified sampling by Hunt and Tyrrell (2001). The propensity score is estimated using the number of funds per advisor and total advisor size as well as age, turnover and expenses of the advisor defined as the TNA-weighted averages of the corresponding fund-level measures. We require that the difference between the propensity score of advisors that increased the number of external funds and its matching peer not exceed 0.1 in absolute value. We then compare the performance between the two groups and report the difference. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. The sample period is 1996-2011.

Panel A: T-Test Analysis

	All In house funds		In house funds in the CORE Max		In house funds in the CORE (50)	
	Diff Adv Performance	p-value	Diff Adv Performance	p-value	Diff Adv Performance	p-value
Outsourced any funds	0.0198	0.02	0.0108	0.23	0.0194	0.04
Top Decile- Bottom Decile	0.0668	0.00	0.0545	0.00	0.0671	0.00
Outsourced NON CORE (MAX) funds	0.0483	0.00	0.0322	0.00	0.0310	0.01
Outsourced NON CORE (50%) funds	0.0479	0.00	0.0441	0.00	0.0448	0.00

Panel B: Propensity Score Matching

	All In house funds		In house funds in the CORE (MAX)		In house funds in the CORE (50)	
	Nearest Neighbor	Stratified Sampling	Nearest Neighbor	Stratified Sampling	Nearest Neighbor	Stratified Sampling
Outsourced any funds	0.036***	0.028***	0.022***	0.020***	0.033***	0.032***
Outsourced NON CORE (MAX) funds	0.035**	0.038***	0.025**	0.037***	0.022**	0.029**
Outsourced NON CORE (50%) funds	0.047***	0.052***	0.037**	0.055***	0.038***	0.053***

5.2.3 Regression Analysis

To test the hypothesis that in-house funds are better managed when their advisory firms increase the proportion of outsourced funds, we estimate the following regression model:

$$Performance_{i,t} = a_0 + a_1 Outsourcing\ Firms_{i,t-12} + a_2 X_{i,t} + A_{i,t} + e_{i,t}\,, \qquad [6]$$

where $Performance_{i,t}$ is advisor performance measured by the TNA-weighted averages of the corresponding fund-level alpha using the 9-factor model previously described. $Outsourcing\ Firms_{i,t}$ is a dummy variable that equals 1 if fund i is internally managed by an advisor who increased the proportion of outsourced funds in month t-12. X is a vector of advisor-specific control variables, including Advisor Age, Advisor Expenses, Advisor Turnover, Advisor Flows and Advisor Past Returns. These variables are defined as the TNA-weighted averages of the corresponding fund-level measures. Advisor Size is the logarithm of the TNA of all advisor funds excluding the fund itself, and Advisor Funds is the natural logarithm of the number of advisor funds. Control variables are lagged by 12 months. We estimate [6] using an advisor fixed effect ($A_{i,t}$) regression model to determine how the main variable of interest affects performance within the same advisory firm over time. We clustered the standard errors at the advisory firm level.

Table 12 displays the estimation of [6] for all U.S. advisory firms managing mutual funds from 1996 to 2011. The first row specifies the fund type used to calculate the dependent variable, advisory performance, and the second row classifies the main variable, outsourcing firm, based on the type of fund the firm has outsourced. We find that outsourcing any type of funds does not affect advisor performance, while outsourcing funds that are not within the core competency of the firm has a considerable effect. This positive impact on performance is more significant for in-house funds that those within the core competency of the firm. This finding is statistically significant across every specification. In economic terms, we can conclude that outsourcing firms that increased the proportion of outsourced funds that were not within their core competency experienced an increase in the performance of their core in-house managed funds, outperforming those of integrating firms by 24.6 to 34.6 bps per year.

TABLE 12. THE EFFICIENCY OF OUTSOURCING (II)

Table 12 presents the results for advisor fixed effect estimates of risk-adjusted returns on the proportion of outsourced funds and other advisor characteristics. The dependent variable is advisor performance measured by the TNA-weighted averages of the corresponding fund-level alpha using the 9-factor model previously described (FF9). Advisor performance is calculated using either all in-house funds or only in-house funds that are within the core competency of the advisor. Outsourcing firms is a dummy variable that equals 1 if the advisor increased the proportion of outsourced funds during the prior year and 0 otherwise. We also classified this measure using any outsourced funds or only outsourced funds that are not within the core competency of the advisor. The core competency of the advisor is defined as the maximum asset class expertise (Max) or at least 50% expertise. Advisor Age, Advisor Expenses, Advisor Turnover, Advisor Flows and Advisor Past Returns are defined as the TNA-weighted averages of the corresponding fund-level measures. Advisor Size is the logarithm of TNA of all funds in the advisor, excluding the fund itself, and Advisor Funds is the natural logarithm of the number of funds in the advisor. Control variables are lagged by 12 months. The sample contains observations for all U.S. advisory firms from 1996 to 2011. The constant term has been omitted. Standard errors are clustered at the advisor level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	All In house funds			In house funds in the CORE (Max)			In house funds in the CORE (50%)		
Advisor Performance	Any Outsourced	Outsourced Non-core (max)	Outsourced Non-core (50)	Any Outsourced	Outsourced Non-core (max)	Outsourced Non-core (50%)	Any Outsourced	Outsourced Non-core (max)	Outsourced Non-core (50%)
Outsourcing Firms	0.0048	0.0192**	0.0151*	0.0039	0.0253***	0.0252**	0.0155*	0.0205**	0.0288***
	(0.68)	(2.50)	(1.66)	(0.48)	(2.95)	(2.56)	(1.90)	(2.29)	(2.96)
Advisor Age	0.0077***	0.0059***	0.0061***	0.0075***	0.0058***	0.0059***	0.0062***	0.0047***	0.0046***
	(7.13)	(5.45)	(4.73)	(5.63)	(4.20)	(3.76)	(4.31)	(3.23)	(2.85)
Advisor Expenses	0.0179	-0.0336	-0.0332	0.0554*	-0.0130	0.0159	0.0827***	-0.0030	0.0070
	(0.77)	(-1.28)	(-1.07)	(1.96)	(-0.40)	(0.46)	(2.95)	(-0.10)	(0.22)
Advisor Turnover	-0.0003***	-0.0002***	-0.0002***	-0.0003***	-0.0002***	-0.0001**	-0.0002***	-0.0001**	-0.0001
	(-4.91)	(-3.32)	(-3.14)	(-4.80)	(-3.28)	(-2.17)	(-4.23)	(-2.20)	(-1.62)
Advisor Flows	0.0081	-0.0005	-0.0037	0.0076*	-0.0010	-0.0029	0.0035	-0.0039	-0.0043
	(1.61)	(-0.07)	(-0.51)	(1.78)	(-0.13)	(-0.38)	(0.95)	(-0.53)	(-0.57)
Advisor Past Returns	0.2520***	0.3162***	0.2158***	0.3269***	0.4098***	0.2936***	0.3154***	0.4201***	0.3074***
	(4.96)	(5.80)	(3.23)	(5.54)	(6.41)	(4.05)	(4.91)	(6.17)	(4.06)
Advisor Size	-0.0414***	-0.0195***	-0.0292***	-0.0383***	-0.0110	-0.0086	-0.0350***	-0.0066	-0.0054
	(-6.14)	(-2.67)	(-3.16)	(-4.78)	(-1.22)	(-0.83)	(-3.96)	(-0.70)	(-0.52)
Advisor Funds	0.0005**	-0.0001	0.0004	0.0010***	0.0001	0.0000	0.0012***	0.0002	0.0001
	(2.05)	(-0.49)	(1.04)	(3.07)	(0.20)	(0.09)	(3.63)	(0.41)	(0.34)
Observations	9485	7549	5854	8855	6979	5472	7951	6170	5154
Adjusted R^2	0.344	0.388	0.426	0.335	0.378	0.426	0.381	0.444	0.455

5.3.Sub-advisor Expertise and Fund Performance

In this section, we investigate the apparent inconsistency between the investment fund industry and other industries regarding the improved results that are achieved if activities beyond the core competency are outsourced. As we noted in Section 2, the mutual fund literature on sub-advising demonstrates underperformance. However, these studies did not consider the importance of the firm's core competency. To explore our fifth hypothesis, that an advisor's core competence that differs from the fund style positively affects outsourcing, we re-estimate equation [5] limiting the sample to the following groups: 1) funds managed in-house by a non-specialist advisor and 2) outsourced funds. [51]

As indicated in Table 13, *Subadvised* is not statistically significant (except in model 1), suggesting that there is no significant difference in fund performance between managing a fund in-house when the principal advisor is not an expert and outsourcing the fund to an external company. However, consistent with the previous hypothesis, as the selected sub-advisor obtains more expertise in the fund asset class, the outsourced fund outperforms its in-house managed peer. In particular, Model 5 suggests that a fund managed by a fully experienced sub-advisor (Sub-expertise class variable equal to 100%) in the fund's asset class will outperform a fund managed internally by a non-specialist advisor by approximately 43.4 bps per year.

Therefore, when the principal advisor is not familiar with some aspects of the fund style, it is not suboptimal to outsource that fund to an external firm. Moreover, if that sub-advisor is highly experienced in that specific fund style, this outsourcing decision will improve performance. Overall, sub-advisor specialization seems to exert a significant and positive economic impact on mutual fund performance.

[51] A fund managed by a non-specialist advisor is managed by firms that mostly manage (at least 95%) funds of other types. An outsourced fund with a conflict of interest is a fund managed by an unaffiliated firm that also manages and distribute its own funds.

TABLE 13: PERFORMANCE OF OUTSOURCING WHEN THE ADVISOR HAS NO EXPERIENCE WITH THE GIVEN FUND TYPE

This table presents the results of the monthly panel regressions of risk-adjusted returns on fund characteristics. The sample contains U.S. mutual funds from 1996 to 2011 that are either subadvised to an unaffiliated firm or managed in-house by an advisor that is not experienced in the fund style (less than 5 on the ratio of Advisor TNA on fund's asset class over all Advisor TNA). Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by the alpha from the CAPM, Fama-French three factors (FF3), Carhart's 4 factors (FF4) model, Carhart's model augmented by an international index and a global bond index (FF6) and Carhart's model augmented by 3 government bond indexes and 2 corporate indexes (FF9). Subadvised is a dummy variable that equals 1 if the fund is subadvised to an unaffiliated firm and 0 if it is managed in-house by an advisor without expertise. Class Sub Expertise measures subadvisor expertise in terms of fund asset class (ratio of Subadvisor TNA on fund's asset class over all Subadvisor TNA). The set of control variables has been previously defined. Time and investment objective dummies are included but not reported; the constant term has also been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) CAPM	**(2)** FF3	**(3)** FF4	**(4)** FF6	**(5)** FF9
Subadvised	-0.0463*	-0.0279	-0.0255	0.0012	-0.0328
	(-1.82)	(-1.19)	(-1.10)	(0.06)	(-1.37)
Class Sub Expertise	0.0431***	0.0600***	0.0579***	0.0421***	0.0362***
	(2.76)	(4.58)	(4.42)	(3.43)	(2.61)
Fund Size	-0.0113**	-0.0104**	-0.0104**	-0.0127***	-0.0103**
	(-2.17)	(-2.41)	(-2.45)	(-2.90)	(-2.17)
Advisor Size	-0.0039	-0.0020	-0.0014	-0.0019	0.0049
	(-0.62)	(-0.37)	(-0.28)	(-0.35)	(0.82)
Advisor Funds	0.0856**	0.0958***	0.1104***	0.0839***	0.0445
	(2.50)	(3.46)	(4.13)	(2.94)	(1.49)
Subadvisor Size	0.0191**	0.0190***	0.0167***	0.0170**	0.0217***
	(2.39)	(2.88)	(2.59)	(2.48)	(2.83)
Subadvisor Funds	-0.1090***	-0.1133***	-0.1247***	-0.1019***	-0.0878***
	(-3.25)	(-4.12)	(-4.69)	(-3.55)	(-2.98)
Fund Age	0.0009	0.0009	0.0011	0.0004	0.0003
	(0.87)	(1.01)	(1.13)	(0.46)	(0.32)
Fund Expenses	-0.0440*	-0.0648***	-0.0663***	-0.0337*	0.0233
	(-1.77)	(-3.13)	(-3.19)	(-1.96)	(1.24)
Fund Turnover	0.0087***	0.0107***	0.0118***	-0.0017	-0.0031
	(3.04)	(3.52)	(3.46)	(-0.45)	(-0.95)
Fund Flows	0.0056***	0.0044***	0.0045***	0.0042***	0.0066***
	(3.81)	(3.41)	(3.30)	(2.69)	(4.09)
Past Return	1.2900***	1.0852***	1.0168***	0.9213***	0.7903***
	(23.61)	(23.85)	(23.41)	(20.22)	(14.60)
Observations	79554	79554	79554	79554	79554
Adjusted R^2	0.195	0.175	0.164	0.158	0.102
Time dummies	Yes	Yes	Yes	Yes	Yes
Investment Objective dummies	Yes	Yes	Yes	Yes	Yes

6. Core competencies and Advisor-Subadvisor business relationships

6.1 Commercial Relationships and Outsourcing decisions

In this final section, we examine the role of core competencies in outsourcing decisions accounting for the existence of business connections among fund families and sub-advisors. To that end, we re-estimate model [4], which examined the relationship between outsourced fund style and sub-advisor expertise, but we now include a new variable, *High Relation*, which captures the special case where a fund family that has outsourced a high proportion of funds to the same sub-advisor.

High Relation is a dummy variable that equals 1 if the number of funds the sub-advisor manages for the family out of the total number of funds the family has currently outsourced is greater than the median and 0 otherwise. For example, suppose a fund family has outsourced 100 funds to three different sub-advisors. The first sub-advisor manages 10 funds, the second manages 30 the third manages 50. Because the median is 30, *High Relation* is coded 1 for the funds outsourced to the third sub-advisor and 0 for the funds outsourced to the other firms.[52] We also include an interaction term between the variables *High Relation* and *Subadvisor expertise* to test whether the expertise of the sub-advisor still significantly determines sub-advisor selection under a high commercial relationship.

Table 14 provides the estimates of the logistic specification by asset class. We must allow the marginal effect of sub-advisor expertise to be conditioned by the type of commercial relationship. In particular, the marginal effect of sub-advisor expertise is described as follows:

$$\frac{\partial Fund\ Asset\ Class}{\partial Class\ Sub\ Expertise} = \widehat{Mfx}_{sub\ expertise} + \widehat{Mfx}_{high\ relation*sub\ expertise} * High\ Relation \qquad [7]$$

Thus, for equity sub-advised funds, $\widehat{Mfx}_{sub\ expertise} = 1.427$ and $\widehat{Mfx}_{high\ relation*sub\ expertise} = -0.398$. Therefore, an increase of one standard deviation in *Class* (*equity) sub expertise*

[52] In our proxy variable for the commercial relationship, we assume that the management company only performs management tasks, so the only way of having some business relations with other management companies is that they have somehow been sharing the management of some of their portfolios.

(0.418) implies a sub-advisor with a high relation (1.427-0.398*0.418) who is 43% more likely to be optimally assigned to an equity fund (in terms of expertise). However, without such a strong relationship between companies, the same increase in expertise leads to an increase of 59.6% in the likelihood of optimal fund allocation. Thus, business relationships between management companies might create friction between the core competency and outsourcing decisions. This result is similar across the other three asset classes.

Table 15 presents the results when sub-advisor expertise is based on investment objectives. Overall, the main results remain unchanged. For instance, increasing the capital appreciation expertise of a sub-advisor without a strong relationship to the fund family by one standard deviation makes such a sub-advisor 5.7% more likely to be correctly assigned to a capital appreciation fund than if it had such relationship with the family. Commercial relationships also significantly diminish the effect of sub-advisor expertise for government long-term funds and corporate debts. However, this effect was weak for government short-term funds, which had a negative but non-significant interaction term coefficient. For the other models, an increase of one standard deviation in expertise increases the likelihood of a sub-advisor without a commercial relationship being properly assigned compared to a sub-advisor with a strong relationship with the fund family.

Overall, the results presented in this section indicate that when there is a strong relationship between the sub-advisor and fund family, in the sense that the sub-advisor manages a substantial number of funds for that family, the core competency and sub-advisor expertise had weaker effects on sub-advisor appointment. Therefore, a sub-advisor might not manage the funds in which they are more experienced but rather those from families that are highly dependent on the sub-advisor.

Note that the effect of these business connections differs across fund objectives. In particular, the effect is stronger for capital appreciation and growth equity funds as well as government long-term and corporate debt funds.

TABLE 14: ASSET CLASS EXPERTISE, SUBADVISOR CHOICE AND COMMERCIAL RELATIONS

Table 14 presents the results of cross-sectional time series logistic regression models of the probability of a fund belonging to one of four asset classes. The sample contains all U.S. outsourced mutual funds from 1996 to 2011. The dependent variable is an indicator variable for whether the subadvised fund belongs to the equity, debt, balance or international class in each three-column panel. The explanatory variable is High Relation, which equals 1 if the ratio between the number of funds managed by the same fund subadvisor and total advisor funds is above the median. The remaining variables have been previously defined. Interaction terms between High Relation and the Subadvisor Expertise of the fund class are also included. The constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) Subadvised Funds (Equity)		(2) Subadvised Funds (Debt)		(3) Subadvised Funds (Balance)		(4) Subadvised Funds (International)	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
High Relation	0.635***	0.157***	0.706***	0.048***	0.301	0.007	0.249	0.018
	(3.056)	0.500	(2.898)	0.500	(0.958)	0.500	(0.993)	0.500
Class Sub Expertise	5.764***	1.427***	6.645***	0.456***	8.453***	0.204***	7.347***	0.522***
	(25.407)	0.418	(17.120)	0.359	(7.903)	0.146	(21.909)	0.319
High Relation*Class Sub Expertise	-1.609***	-0.398***	-1.983***	-0.136***	-2.419**	-0.058**	-1.228***	-0.087***
	(-5.653)	0.356	(-4.465)	0.280	(-2.013)	0.113	(-2.860)	0.209
Fund Size	0.083**	0.021**	-0.226***	-0.016***	-0.130	-0.003	0.118**	0.008**
	(1.979)	1.989	(-4.026)	1.989	(-1.630)	1.990	(2.212)	1.989
Subadvisor Size	-0.096	-0.024	0.127	0.009	0.157	0.004	0.158**	0.011**
	(-1.622)	3.771	(1.538)	3.771	(1.360)	3.768	(2.422)	3.771
Subadvisor Funds	0.361**	0.089**	-0.130	-0.009	-0.105	-0.003	0.126	0.009
	(2.332)	1.360	(-0.614)	1.360	(-0.371)	1.360	(0.728)	1.360
Fund Age	-0.018	-0.004	0.028*	0.002*	0.043***	0.001***	-0.010	-0.001
	(-1.285)	7.882	(1.729)	7.882	(3.418)	7.878	(-0.767)	7.882
Fund Turnover	-0.110***	-0.027***	-0.029	-0.002	-0.006	-0.000	0.043**	0.003**
	(-3.255)	2.227	(-1.565)	2.27	(-0.178)	2.228	(2.435)	2.227
Fund Expenses	0.664***	0.164***	-2.399***	-0.165***	-0.171	-0.004	1.172***	0.083***
	(4.292)	0.539	(-9.397)	0.539	(-0.523)	0.539	(4.932)	0.539
Fund Flows	-0.019	-0.005	0.041***	0.003***	-0.076	-0.002	0.001	0.000
	(-1.551)	2.810	(2.956)	2.810	(-1.149)	2.812	(0.038)	2.810
Past Return	-1.099***	-0.272***	0.605	0.042	-0.601	-0.015	1.637***	0.116***
	(-3.232)	0.173	(1.442)	0.173	(-1.168)	0.173	(3.714)	0.173
Observations	4716		4716		4716		4716	
Pseudo R2	0.466		0.591		0.339		0.561	
Baseline predicted probability	0.522		0.233		0.051		0.178	
Time dummies	Yes		Yes		Yes		Yes	

TABLE 15: INVESTMENT OBJECTIVE EXPERTISE, SUBADVISOR CHOICE AND COMMERCIAL RELATIONS

Table 15 presents the results of cross-sectional time series logistic regression models of the probability of a fund belonging to one of seven equity and debt investment objective categories. The sample contains equity and debt U.S. mutual funds outsourced from 1996 to 2011. The dependent variable is an indicator variable for whether the subadvised fund belongs to capital, growth, income, return investment, government short-term (ST), government long-term (LT) or corporate fund objectives in each two-column panel. The explanatory variable is High Relation, which equals 1 if the ratio between the number of funds managed by the same fund subadvisor and total advisor funds is above the median. The remaining variables have been previously defined. Interation terms between High Relation and the Subadvisor Expertise of the fund invesment objective are also included. The constant term has been omitted. Standard errors are clustered at the fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

	(1) Subadvised Funds (Capital)		**(2)** Subadvised Funds (Growth)		**(3)** Subadvised Funds (Income)		**(4)** Subadvised Funds (Return)		(5) Subadvised Funds (Gov ST)		(6) Subadvised Funds (Gov LT)		(7) Subadvised Funds (Corporate)	
	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std	Coef/t	Mfx/Std
High Relation	-0.036	-0.006	0.613***	0.041***	0.156	0.002	-0.144	-0.002	0.269	0.000	0.759***	0.031***	0.709**	0.013**
	(-0.178)	0.500	(2.691)	0.500	(0.417)	0.500	(-0.409)	0.500	(0.481)	0.500	(3.200)	0.500	(2.425)	0.500
Objective Sub Expertise	5.655***	0.926***	5.777***	0.384***	7.772***	0.113***	8.643***	0.098***	8.487***	0.009***	7.233***	0.292***	8.444***	0.155***
	(21.041)	0.349	(18.844)	0.285	(10.521)	0.163	(13.245)	0.186	(7.225)	0.136	(13.989)	0.277	(7.383)	0.177
High Relation*Objective Sub Expertise	-0.993***	-0.163***	-0.557	-0.037	-1.818**	-0.026**	-1.555**	-0.018**	-2.793	-0.003	-2.589***	-0.105***	-3.141***	-0.058***
	(-2.734)	0.226	(-1.281)	0.199	(-2.102)	0.095	(-2.066)	0.126	(-1.541)	0.119	(-4.323)	0.193	(-2.628)	0.127
Fund Size	-0.005	-0.001	0.070	0.005	0.072	0.001	-0.049	-0.001	0.002	0.000	-0.261***	-0.011***	-0.092	-0.002
	(-0.122)	1.989	(1.430)	1.989	(0.745)	1.990	(-0.567)	1.990	(0.016)	2.013	(-4.907)	1.989	(-1.066)	1.990
Subadvisor Size	0.200***	0.033***	-0.128**	-0.009**	-0.091	-0.001	-0.113	-0.001	-0.069	-0.000	0.044	0.002	0.157	0.003
	(3.711)	3.771	(-2.078)	3.771	(-0.820)	3.768	(-1.008)	3.768	(-0.393)	3.784	(0.594)	3.771	(1.366)	3.768
Subadvisor Funds	-0.134	-0.022	0.486***	0.032***	0.710**	0.010**	0.597*	0.007*	0.520	0.001	0.384**	0.016**	-0.206	-0.004
	(-0.934)	1.360	(2.855)	1.360	(2.532)	1.360	(1.772)	1.360	(1.052)	1.363	(2.013)	1.360	(-0.720)	1.360
Fund Age	-0.019	-0.003	-0.031*	-0.002*	0.028**	0.000**	0.015	0.000	0.038**	0.000**	0.042***	0.002***	-0.028	-0.001
	(-1.221)	7.882	(-1.926)	7.882	(2.041)	7.878	(0.727)	7.878	(2.197)	7.836	(3.354)	7.882	(-1.345)	7.878
Fund Turnover	-0.037	-0.006	-0.077	-0.005	-0.613***	-0.009***	-0.490**	-0.006**	0.041	0.000	-0.029	-0.001	-0.096	-0.002
	(-1.412)	2.227	(-1.420)	2.227	(-3.103)	2.228	(-2.307)	2.228	(0.918)	2.376	(-1.300)	2.227	(-1.616)	2.228
Fund Expenses	0.363**	0.059**	0.448**	0.030**	-0.024	-0.000	0.302	0.003	-2.049***	-0.002***	-2.340***	-0.095***	-1.665***	-0.030***
	(2.133)	0.539	(2.315)	0.539	(-0.084)	0.539	(0.698)	0.539	(-2.822)	0.532	(-8.163)	0.539	(-5.634)	0.539
Fund Flows	-0.035**	-0.006**	-0.010	-0.001	-0.072	-0.001	0.036**	0.000**	0.062	0.000	-0.028	-0.001	0.043***	0.001***
	(-2.233)	2.810	(-0.485)	2.810	(-1.248)	2.812	(2.405)	2.812	(1.482)	2.825	(-1.028)	2.810	(3.122)	2.812
Past Return	-0.478	-0.078	-1.146**	-0.076**	0.070	0.001	0.443	0.005	-6.443***	-0.007***	0.423	0.017	0.990**	0.018**
	(-1.193)	0.173	(-2.391)	0.173	(0.098)	0.173	(0.669)	0.173	(-3.739)	0.170	(1.050)	0.173	(2.120)	0.173
Observations	4716		4716		4716		4716		4716		4716		4716	
Pseudo R2	0.405		0.436		0.422		0.579		0.475		0.547		0.423	
Baseline predicted probability	0.284		0.147		0.049		0.046		0.030		0.151		0.058	
Time dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes	

6.2 Commercial Relationships, expertise and outsourcing decision effects on fund performance

We have demonstrated the joint significance of sub-advisor expertise and family-sub-advisor business connections on sub-advisor selection. In this section, we analyze the impact on fund performance of both aspects of outsourcing decisions. In particular, we compare the time series average of risk-adjusted fund performance using the 9-factor model previously described across four groups of outsourced funds. First, we classify funds by *High* or *Low Style Expertise* (Sub-advisor Expertise is in the fifth (high) or first (low) quintile in terms of investment objective). Second, for each of these groups, we classify the funds based on their level of commercial relationship for volume (number of funds) (Panel A) and length of contracts (Panel B). High (low) levels of volume of contracts are in funds with above (below) median ratios of the number of advisor funds managed by the same fund sub-advisor compared to the total advisor funds. Long (short) contracts are relationships between the family and sub-advisor greater (shorter) than 3 years. Third, we compare four portfolios of funds.

To determine the significance of the differences, we perform a Portfolio Analysis (Two-group mean-comparison Test). Table 16 Panel A indicates that for both low and high commercial relationships, high style expertise funds make the greatest difference. Whereas funds with high sub-advisor expertise are characterized by an alpha 48 bps higher per year for either high or low levels of commercial relationships, funds with strong commercial relationships barely gain 2.4 bps for low levels of expertise and 28 bps for high levels of expertise. In Panel B, we observe the same general pattern in terms of the length of the contract. Overall, these results suggest that choosing a sub-advisor based on expertise has a greater impact on fund performance than a selection based on commercial relations (in terms of both volume and length of the agreement). Therefore, we once again demonstrate the importance of core competency in management decisions. [53]

[53] The variable used to measure commercial relationships might capture the current family-sub-advisor relationship and not past connections. Thus, in the last part of the empirical analysis, we construct a proxy for a past commercial relationship. This measure contains the average number of funds managed by the same sub-advisor among the total number of funds the family has outsourced over the last two years. The main results are consistent. The results of this last section are not reported to save space but are available upon request.

TABLE 16: SUBADVISOR EXPERTISE, COMMERCIAL REALTIONS AND FUND PERFORMANCE

Table 16 presents the monthly average of risk-adjusted fund performance using the 4-factors Carhart model augmented by 5 factors (Short-Term, Intermediate and Long-Term Government Bonds Indexes, and High Yield and Investment Grade Corporate Bonds) for all U.S mutual funds that were outsourced from 1996 to 2011. High or Low Objective Expertise equals 1 if Subadvisor Expertise is in the fifth (high) or first (low) quintile in terms of Investment Objective (ratio of Subadvisor TNA on fund's investment objective over all Subadvisor TNA). Panel A summarizes average fund performance noting the Objective Expertise of the subadvisor and the volume of the Commercial Relation between the principal advisor and fund subadvisor (High and Low Commercial Relation equals 1 if the ratio of the number of advisor funds managed by the same fund subadvisor and total advisor funds is above or below the median, respectively). Panel B summarizes the average fund performance, noting the Objective Expertise of the subadvisor and the length of the Commercial Relation between the principal advisor and fund subadvisor (Long and Short Commercial Relation is equal is 1 if there is a relation between advisor and subadvisor greater or shorter than 3 years, respectively). To determine the significance of the differences, we perform a t-test across groups. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.

Panel A: Commercial Relations in terms of volume of agreements

Average Alpha 9-F	Low Objective Expertise (obs)	High Objective Expertise (obs)	Difference T-test
Low Commercial Relation (obs)	-.01574 (26238)	.02537 (20472)	.04111 ***
High Commercial Relation (obs)	.00753 (38484)	.04789 (11619)	.04035 ***
Difference t-test	.00189 ***	.02251 ***	

Panel B: Commercial Relations in terms of the length of the agreements

Average Alpha 9-F	Low Objective Expertise (obs)	High Objective Expertise (obs)	Difference T-test
Short Commercial Relation (obs)	-.00442 (18227)	.02200 (7207)	.02642 ***
Long Commercial Relation (obs)	-.00075 (47317)	.03680 (24912)	.03756 ***
Difference t-test	.00366	.01480**	

7. Conclusions

Despite the rapid growth of outsourcing in the mutual fund industry, there has been relatively little research on how outsourcing portfolio management decisions are made in this industry. Studies of this new business model for mutual funds have focused on the performance of outsourced funds compared to the performance of funds managed in-house, demonstrating that externally managed funds significantly underperform internally managed funds. This negative effect of outsourcing in the mutual fund industry has not explained why mutual fund families have used outsourcing so widely over the past decade. In this paper, we analyze the role of core competencies in explaining both outsourcing decisions and the growth of outsourcing in the mutual fund industry over the last decade.

First, we examine whether the advisor's core competency affects which funds are managed externally and whether the sub-advisor is chosen based on their core competency. We observe that fund families mainly outsource funds that fall outside their core competency. This result is consistent with previous research on mutual funds that noted that families wish to provide a wider menu of funds to investors to maximize net inflows. Furthermore, sub-advisors are more likely to be assigned to manage the funds styles in which they are more experienced. This result is also consistent with prior industrial organization research, which claims that to improve results, companies should focus on activities that represent their core competency and outsource other activities or tasks to companies that specialize in those activities.

Second, we examine whether mutual fund performance has improved due to the outsourcing of portfolio management activities and whether this explains the rapid growth of this practice over the last decade. Our hypothesis, based on the industrial organization literature, is that outsourcing the portfolio management of funds that fall outside a family's core competency allows the company to focus on its core competency and improve the performance of funds managed in-house. In addition, outsourcing the funds outside of its core competencies allows the family to achieve a wider (more diversified) portfolio of

mutual funds to offer its customers (which, according to recent research on family organization, also attracts greater net inflows).

Advisors who outsource the management of funds that are beyond their core competency improve the performance of the funds managed internally compared with investment companies that maintain in-house management of such funds. The improved performance of funds managed in-house is consistent with the literature on industrial organization and helps explain the growth of outsourcing. Another result that helps explain the use of outsourcing over the last decade is a special case in which the advisor has no experience in a fund style. In this situation, there is no significant difference in fund performance between funds managed in-house by a non-specialist advisor and funds managed externally. However, if the sub-advisor is highly experienced in managing those funds (i.e., the fund is within its core competency), the performance of the outsourced fund will exceed that of a fund managed in-house by a non-specialist. This result is consistent with prior industrial organization research that claims that by allowing outside specialist organizations to concentrate on certain tasks, firms can improve their performance by focusing on the things they do best.

Examining whether commercial relationships among fund families and sub-advisors affect outsourcing decisions and fund performance is another important contribution of this study. We examine how sub-advisor expertise affects sub-advisor selection conditional on how many family funds have been managed by the same sub-advisor and the length of the contracts. Our results suggest that either higher volume or longer sub-advisory contracts reduce the effect of firm expertise when selecting a sub-advisor. Thus, we argue that when fund families select a sub-advisor to manage their funds, they can rely not only on core competencies but also on past and current commercial relationships to avoid the risks associated with a new business relationship. Contracting with a sub-advisor based on its core competency has a greater impact on performance than decisions based on the volume or length of the sub-advisory agreement between a fund family and sub-advisor. In addition, our findings suggest that the optimal way of making such decisions is to consider both expertise and business relationships.

APPENDIX: DEFINITIONS OF ASSET CLASSES AND INVESTMENT OJECTIVES

Under the Investment Act of 1940, an investment company must register with the Securities and Exchange Commission (SEC). All U.S. mutual fund and other regulated investment management companies are required to file Form NSAR (along with other documents) on a semi-annual basis. According to this form, funds must be classified into different asset classes and the investment objective. A summary of definitions for these categories is provided by the SEC to registrants, which we used to classify the funds (for a detailed description, see https://www.sec.gov/about/forms/formn-sar.pdf)

ASSET CLASS

- **Equity**: invests in equity securities, options and futures on equity securities, indices of equity securities or securities convertible into equity securities.
- **Debt**: invests primarily in debt securities, including convertible debt securities, options and futures on debt securities or indices of debt securities.
- **Balance**: at least 25% of the value of the fund should be invested in debt securities, preferred stock, or a combination of both. If convertible senior securities are included in the required 25%, only the portion of their value attributable to their fixed income characteristics may be used to calculate the 25% figure.
- **International**: more than 50% of its net assets at the end of the current period must be invested in securities located primarily in countries other than the United States.

INVESTMENT OBJECTIVE

Equity Funds

- **Aggressive Capital Appreciation**: primarily and regularly seeks short-term appreciation through high-risk investment with little or no concern for receipt of income.
- **Capital Appreciation**: primarily and regularly invests in an intermediate-term return by investing in moderate to high-risk securities with little or no concern for receipt of income.
- **Growth**: seeks long-term growth with a moderate degree of risk. Receipt of income may be considered to some degree in selecting investments.
- **Growth and Income**: primarily and regularly makes low risk investments with the objective of capital growth and income production.
- **Income**: the receipt of income is the primary reason for selecting portfolio securities.
- **Total Return**: portfolio includes a varying mix of equity and debt securities.

Debt Funds

- **Government Short-Term**: Short-Term Maturities of U.S. Treasury, U.S. Government Agency and State and municipal tax-free funds.
- **Government Long-Term**: Intermediate and Long-Term Maturities of U.S. Treasury, U.S. Government Agency, State and Municipal tax-free funds.
- **Corporate**: Intermediate and Long-Term Maturities of Corporate assets.

For purposes of the NSAR Form, short-term maturities are defined as securities with maturities of 12 months or less. Securities with variable or floating interest rates or that are subject to a demand feature should be considered short-term if the interest rate adjustment period or demand period is 12 months or less. Intermediate and long-term maturities include all other debt securities.

Chapter 4: Team Players vs All-Stars in Socially Responsible Investment Funds

1. Introduction

US registered investment companies play a major role in the US economy and around the world financial markets. According to the Investment Company Institute (ICI Fact Book, 2014), there are 30 trillions of dollars in mutual funds asset worldwide, with half of them ($15 trillions) in the US mutual fund market. In an industry that is becoming more and more competitive, with a growing universe of investments and greater complexity of assets, a team management structure seems to be more optimal for handling and proceeding larger volume of information related to the investment management decisions. Consistent with this phenomenon, there has been an outstanding growth of team management in the mutual fund industry over the past two decades. For example, by mid 90s, the proportion of team managed funds was barely 30% while today this figure went up to nearly 70%. Despite the notable switch toward team-based portfolio management, the extant academic literature has not found clear performance benefits of teamwork in the fund industry.

Team management can gain and profit from larger intrinsic knowledge and this should be accompanied with portfolios under team structures being outperforming those managed by an individual manager. Prior literature has also posits that team management achieves diversification of decisions and styles that reduces fund risk enhancing the portfolio performance (Barry and Starks (1984); Sah and Stiglitz (1991)). However, most of the current research on fund management structure is unable to evidence it. For example, Prather and Middleton (2002); Chen et al. (2004); Bliss et al. (2008); Massa et al. (2010); Bar et al. (2011) and Adams et al. (2013) find that the performance of individual managed funds are as good as (or even better) than the performance of team managed funds. This results together with the fact that there are about one third of portfolios that are still managed by individual managers, arise the interest of studying what are the advantage of

individual portfolio management as well as under which circumstances such organization structure is more suited than team management.

Stein (2002) investigates how well different organizational structures perform and finds that while a decentralized approach (individual) perform better when there are task that involve processing soft information (information that cannot be contrasted by any other agents but the one that obtained it), a centralized approach (team) will be more optimal if they are working with hard information (it can be passed along within agents at no cost). In the context of portfolio management, soft and hard information can be associated with the volume of asset a manager is involved. For example, when a manager has to follow specific guidelines and must focus on a concrete sector or set of firms, soft information can be feasible and an effective way of collection reliable information.

In this chapter, I examine whether individual management leads to better performance, relative to team management approach, when portfolio managers face a restricted investment opportunity set. Socially responsible investment (SRI) funds industry provides an ideal empirical setting in this context as these funds implements strict social criteria that exclude firms, economic sectors or even entire industries from their portfolios. Unlike conventional class of investments, SRI funds apply a set of investment screens to select stocks from an investment pool based on social, environmental or ethical (SEE) criteria. This implies a shorter universe from which a fund manager allocates their assets and greater coordination requirements. One of the advantages of using this specific investment industry is that, unlike sector funds, SRI selects the number of screens to apply to its investment portfolio. Thus, this allows us to compare not only restricted vs non-restricted portfolios but also within different levels of restrictions. Another important benefit is that despite the increasing trend of team management approach, there are many portfolios that are still managed by individual employees, hence we can evaluate differences between team and individual structures in general and also interact them between conventional and SRI funds.

Coordination costs in reaching an optimal decision under time constraints present in the portfolio management industry is one of the disadvantages of using a team approach, which can be solved by an individual management structure. This study is more focused on

finding the benefit of individual over team management rather than studying the disadvantages of team-work previously shown of problems of free-riding and decreasing cooperation effectiveness (Alchian and Demsetz (1972); Holmstrom (1982); Laughlin, Hatch, Silver, and Boh (2006); Mueller (2012)). Thus, we do not claim that one organizational design is generally better than the other but simply that one can be preferred over the other depending on the situation.

Consistent with the Steiner's theory of process loss (1972), in which individuals in larger teams are predicted to perform worse because they experience lower levels of coordination, we claim that allocate individuals to work by themselves serves to avoid coordination cost in situations where a clear mandates is set. We find that even though there is no significant differences between neither SRI and Conventional funds nor Individual and Team management structures, the combination of SRI funds managed by a solo-manager outperform on more than 1% per year. This result is robust to different econometrical approaches and performance measures. The intuition here is that team managed portfolios are better the more heterogeneous is the investment opportunity set. Therefore, it is not a simply coincidence that the increase in team managed funds occurs simultaneously with globalization and bullishness of the stock market, as Ramy Shaalanstated.[54]

We also test several alternative explanations and we reject all of them. For example, we show that SRI funds managed by individuals hold riskier portfolios than other funds consistent with the diversification of opinion hypothesis of Sharpe (1981) and Sah and Stiglitz (1986, 1988). This was empirically tested by Bar et al. (2011) for team vs individual in the mutual fund industry. Thus, the higher performance of SRI funds managed by individuals might be driven by holding more concentrated portfolios. However, after controlling for idiosyncratic risk the results remain unchanged. Another alternative explanation in this regard is that SRI funds were created for different interest than the mere fact of obtaining returns and hence not being fairly compared to conventional funds. We

[54] Ramy Shaalan is a portfolio analyst at Wiesenberger.

take this in to account and examine how different level of investment social screenings affect the performance of funds managed individually. We show that funds with higher levels of portfolio investment constrains are better run under a solo-management structure.

We provide evidence that those individual managers in charge of SRI funds seem to have a more adequate profile for portfolio management in terms of being graduated for Ivy League universities, having a more quantitative background and holding a PhD degree. Thus, one might be concerned about a self-selection of top managers deciding about the organizational structure and investment social criterion. In order to rule out this hypothesis, we control for endogeneity issues and we find again that SRI funds have better performance when they are managed by a solo individual.

Social concerned investors might be aware of this phenomenon; we find that SRI funds managed by individual investors receive more flows than other funds. Professionals from this industry also have similar view about differences between individual and team management. For instance, Stephen Oristaglio, senior managing director at Putman, said that team-management make more sense when investing become more complicated with so many opportunities, industries, markets and companies. Additionally, Richard Spillane, senior vice president at Fidelity, claimed that they are not religious about using team or individual management approach. They use one way or the other depending on the situation. For example, Fidelity typically use individual approach where there is a single mandate since this leads to "crisper information processing and decision-making".

Other studies also relate the type of information the portfolio manager is processing with the organizational structure of the fund. For instance, Chen et al. (2004) suggest that team managed approach, unlike individuals, need to rely more on hard information (quantitative measures of firms) so as to convince team-workers to implements their ideas. Thus, they examine whether individual managed funds are or not more likely to invest in local stocks. They find that managers are significantly more likely to do that they are better at selecting this local stocks as they can based their investment decisions more on soft information.

Our study contributes to different strand of the literature. First, it contributes to the large literature on the relation between organizational structure of mutual fund management and performance. Second, to the general and broader organizational management literature when manager of corporations face different restrictions and firms suffer from coordination problems. And finally, we also contribute to the growing literature of social concerned investments, in which prior literature are still unsettled about its effectiveness in general performance terms. We provide evidence that this type of investment might be efficient under certain circumstances.

2. Related literature and hypothesis development

In this research, our motivation is drawn from two strands of the literature: 1) Organizational management and 2) Social concern investments.

2.1 Organizational Management

Even though we focus on the mutual fund industry for empirical convenience, our results are not only important for this industry, but it can also help provide insights into the many unanswered questions in the broader team vs individual management literature. For example, are individual better than team work? A part of this literature argue that teamwork benefits from a larger intrinsic knowledge base of the group and give better result than solo-work when their members have specialized and hold complementary skills (e.g., Lazear (1988)) and they are becoming crucial work units to the success of the organizations (Appelbaum et al. (1999)). However, other part of the literature strongly suggests a preference for individual rather than multiple decision-makers because of the difficulty of coordinating group effort (e.g., social loafing)[55], coordination cost in arriving at optimal decisions (e.g., Becker and Murphy (1992)), problems of potential free-riding and decrease of cooperation effectiveness (Alchian and Demsetz (1972); Holmstrom (1982); Laughlin,

[55] See Bibb Latané et al., (1979) and Kravitz and Martin (1986).

Hatch, Silver, and Boh (2006); Mueller (2012)). Therefore, prior literature on this regard seems unsettled with an unclear final statement.

A more comprehensive research of team versus individual work can be found in Stein (2002). This chapter presents when an organizational structure is preferred over the other in terms of generating information about investment projects and allocating capital to these projects. The author rather than posit just one of the structure as the optimal one, suggests that small firms with single-managers perform better when information about projects is soft (information that cannot be verified by anyone other than the agents who obtained it) while large corporation structures are more attractive when having hard information (it can be easily verified by anyone and it is costless to pass it along inside the firm). This opens a key issue for studying the organization structure in portfolio management from the perspective that not necessary team or individual work is more attractive in general terms but it changes depending the circumstances.

In the portfolio manager industry, Sharpe (1981), Barry and Starks (1984) and Sah and Stiglitz (1991) suggest that teamwork should be able to obtain higher performance because of better diversification of style that reduces portfolio risk. However, some other research observes competition between co-leaders resulting in coordination problems and interpersonal conflicts (Hackman (2002)) and delays in decision making (Sah and Stiglitz (1988)). Consistent with this, empirical studies find very little evidence of performance improvement of team management structures in the mutual fund industry. Some examples are Prather and Middleton (2002), Bliss et al. (2008) and Bar et al. (2011) that find that individual managed funds do not do worse than team managed funds. Chen et al. (2004) observe that teamwork leads to lower performance than individual management because teams form a power structure discouraging communication and acquisition of information. Massa et al. (2010) also provide evidence of team managed fund underperform relatively to individual managed portfolios.

More recent papers examine which are the main factors that determine the effectives of individual and team management. For example, Patel and Sarkissian (2012) shows that team managed funds exhibit better performance that individual managed portfolios

depending on team size and diversity as well as its geographic location. Dass et al. (2013) claims that coordination issue is the main driver of difference in performance between individual and team managed funds. Authors find that teamwork leads to lower market timing performance than individual management in balance funds because of the coordination challenge of this task while teams are better at performing tasks that required less coordination such as selecting stocks. Adams et al. (2013) argue that under certain governance structures, collective decision making can be beneficial. They show that team managed funds with highly independent boards significantly improve fund performance relatively to individually managed funds. And regarding the investment behavior of portfolio managers, Patel and Sarkissian (2014) find that team-based funds invest in a larger number of securities than individual managed funds.

2.2 Socially Responsible Investment

Many studies have examined the effectiveness of portfolios that screen their holdings on social criteria and those that do not. This literature presents mixed results. For example, Hamilton and Statman (1993); Diltz (1995); Guerard (1997); Bauer et al. 2005; Jones et al. (2008) or Gil-Bazo et al. (2010) find that SRI funds do not different from conventional funds in terms of performance. Luck and Pilotte (1993); DiBartolomeo and Kurtz (1999); Statman (2000); Kempf and Osthoff (2007) and Galema et al. (2008) provide evidence that funds that screen their holdings perform better than unscreened funds. But other studies, such as Teper (1992) or Geczy et al. (2003) have shown that SRI funds perform worse than conventional funds.

SRI funds have been criticized for being unable to adequately diversify. According to modern portfolio theory (Markowitz (1952)) investors should build portfolios in such a way that the specific risk involved in any individual security is offset by other securities' specific risk. Therefore, portfolios that implements strict social criteria excluding firms, industries or sectors will face a diversification challenge and will be expected to experience lower risk-adjusted returns. A few studies have been suggesting that SRI funds are likely to suffer a financial loss because of this diversification issue (Kurtz and DiBartolomeo (1996);

DiBartolomeo and Kurtz (1999)). On the other hand, some research has argued that the better a firm's social performance, the better it can attract resources (Cochran and Wood, 1984 and Waddock and Graves (1997)) and that SRI funds dampen downside risk for investors during crisis periods (Nofsinger and Varma (2002)). Thus, we will not claim that screened portfolios will systematically lead to better performance but only in cases in which adequately assigned to an individual manager.

We draw our first hypothesis from the Steiner's theory of process loss (1972) in which teamwork is predicted to perform worse since groups are more likely to suffer from higher cost of coordination and motivation losses. Therefore, SRI funds which follows a more restricted mandates and hence it is more difficult to decentralized tasks relatively to conventional portfolios, coordination issues is a challenge that can be solved by employing individual management structures.

HYPOTHESIS 1. SRI funds being managed by individuals do indeed improve performance relatively to other funds.

SRI portfolios vary greatly in the intensity and type of social investment screens so as to allow us to compare not only socially screened with unscreened funds but also within different levels of screened funds. The Social Investment Forum lists 12 types of screens that SRI funds might be subjected to. While having a high screening intensity implies shorter universe of securities from which a portfolio manager can select, low levels of intensity leave the funds close to those conventional portfolios. Prior literature considers SRI portfolios with moderate levels of screening as "stuck in the middle" funds. Barnett and Salomon (2006) argue that these funds cannot either diversify away the specific risk as they are still facing some restrictions or exclude enough poor companies since their investment opportunity set is not constrained enough. Thus, we consider only high and low screening intensity levels since funds with moderate levels of social screenings may be neither enough restricted to employ single mandates nor enough close to conventional funds in terms of their investment universe of assets.

HYPOTHESIS 2. SRI funds managed by individuals facing high levels of social screening investments are better managed than those managed by individuals with fewer screens.

According to Bar et al. (2011) team managed funds take less extreme decisions than individuals do consistent with the diversification of opinion theory and thus, individual managed funds might hold portfolios with higher levels of unsystematic risk. Similary, SRI funds that have a smaller investment universe might also face difficulties to adequately diversify. Since prior literature has noted a positive relation between idiosyncratic risk and expected return when investors do not diversify their portfolio (Merton (1987); Fangjian Fu (2009)), we want to rule out the possibility that higher risk taking behavior is driving the better performance of SRI funds managed by individuals.

HYPOTHESIS 3. Even though SRI funds managed by individuals are under higher levels of specific risk, this behavior is not driving their superior performance.

Massa et al. (2010) find that funds with anonymous portfolio manager receive less media mentions and lower inflows than named managers' funds. On the other hand, SRI funds are targeted to investors than care not only about returns but also about non-financial features. Benson and Humphrey (2007) compare the determinants of fund flows for SRI and conventional funds and suggest that SRI investors might face difficulties in finding alternative investments that meet their non-financial goals. Thus, we claim that these investors might prefer to allocate their capital into portfolios in which the principal managers can be easily identified.

HYPOTHESIS 4. Investors with social concerns will bet for individual managers in which they can trust more rather than in anonymous teams. So these funds will receive more flows.

Many are the research that have considered the possibility that the management company decides that a fund has to follow a given investment style and thus allocate a team or an individual to run that fund for some other reasons that are taking into account (e.g.,

Bliss et al. (2008) or Bar et al. (2010)) or even that top managers might prefer individual management structures (Massa et al. (2010); Han et al. (2012)).

HYPOTHESIS 5. SRI funds are managed by managers with better investment profile, but after controlling for superior managers self-selection, those managing SRI funds in individual structures are still better.

3. Data and preliminary results

3.1. *Data Sources*

We examine actively managed U.S. mutual funds during the period 1996-2011. The data were obtained from different sources: the CRSP Survivor-Bias Free US Mutual Fund Database, Morningstar, the Socialfunds.com and the USSIF.org (formerly known as the Social Investment Forum) websites. Fund returns, total net assets, turnover, expenses and other available fund characteristics such as organizational structure were obtained from CRSP. SRI funds are identified using the Social Funds and The Forum for Sustainable and Responsible Investment websites, as well as cross-checked with Morningstar Direct database.

The CRSP database contains information about multiple fund classes issued by a particular fund. These classes, typically denoted A, B and C, have the same underlying portfolio. The main difference among them is the fee structure. Our observations are made at the class level. We group data by observations at the fund level, consistent with the literature (e.g., Gaspar et al. (2006) or Nanda et al. (2004)). We aggregate returns, weighting each class by total net assets (TNA). We compute the TNA of the fund as the sum of all TNA over all classes. Turnover and expenses are aggregated at the fund level by weighting each class by its total net assets; to determine fund age, we select the oldest class.

We classified socially responsible investment funds according to Morningstar for the year 2011. This might create a situation with a look-back bias because we are assuming that these funds are the only SRI funds of our sample. Thus, using the way-back machine as provided at http://archive.org/web/, we are able to obtain different lists of SRI funds

reported in different years across the period of 1996-2011. A fund will be considered as SRI if it utilizes one or more social or environmental criteria as part of a formal investment policy. Furthermore, we exclude any institution that says it takes into account social or corporate governance criteria in its investment decisions but lacks a formal policy for doing so. We obtain information from the above websites on the social screening activity of SRI funds. We are provided with information about the use of screens in sixteen screening categories sorted by: Environmental issues: Climate/Clean Technology, Pollution/Toxics and Environment/Others. Social issues: Community Development, Diversity and EEO, Human Rights, Labor relations and Sudan. Governance related: Board Issues and Executive Pay. Shareholders engagements and Product: Alcohol, Animal welfare, Defense/Weapons, Gambling and Tobacco. In total, we are able to identify an average of 141 SRI funds per year that ranges from 61 in 1996 to 214 in 2009 and 135 in 2011 along those different categories.

3.2.Summary statistics and preliminary results

Table 1 reports the average of fund (Panel A) and portfolio manager (Panel B) characteristics across all U.S equity open-end funds for the period January 1996 to December 2011. Fund characteristics are: Size (the natural logarithm of total net assets (TNA) under management in millions of dollars); Age (the number of years since inception); Expenses (the total annual expenses and fees divided by year-end TNA); Fee 12b-1 (the annual marketing and distribution fee of the fund); Back and Front loads expressed as percentages of new investments; Turnover (the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year) and Flow (a percentage that represents new inflows into the fund over the previous year). Management Company variable are the logarithm of the number of funds in the family, excluding the fund itself and Company Size (the logarithm of TNA for all funds in the family, excluding the fund itself). Variables at the portfolio manager level are: Ivy League, MBA, PHD and CFA that represent the percentage of managers on conventional and SRI Funds with that degree. Company background is the number of prior job positions of the

manager. Business and Quantitative studies account for the major background of the manager, and experience is the number of years since the manager graduated. This table also reports the difference between Conventional and SRI funds and the P-value associated to that difference.

The results presented in Table 1 are consistent with SRI funds being younger, having less assets, lower expenses, marketing fee and loads. They have also higher levels of turnover and flows and belong to larger families with more number of funds than conventional funds. On average, portfolio managers in charge of SRI funds managed by a solo manager are graduated by an Ivy League, hold a Phd, MBA and Quantitative background and have more experience and have been in more companies that those at similar conventional funds. On the other hand, managers at conventional funds are more likely to hold Business Studies and the CFA degree.

Table 2 reports the average values of fund performance and the idiosyncratic risk sorted by management structures. First column groups funds managed by an individual manager and second column that of team managed ones. In order to rule out that results are driven by specific characteristics of a given period, we report the difference and statistical significance between conventional and SRI funds both for full-sample period and for the sub-periods (1996–2004 and 2005–2011).

Following prior research, we use the four-factor model developed by Carhart (1997) to estimate the abnormal returns, where the intercept of this model captures the fund's before-fee risk-adjusted performance.[56] Because we also consider international, balance and fixed income funds and to be more conservative, we use an additional performance model: a 9-Factor model, which includes the four-factor model (Carhart 1997) and the following five additional risk factors: Barclays US Treasury Bill 1-3 Months, Barclays US Treasury 1-3 Years, Barclays US Government Long, U.S. Corporate High-Yield and U.S. Corporate AAA. For every month from 1996 to 2011, we regress fund gross excess returns (before expenses and subtracting the risk-free rate) on the risk factors over the previous 24 months

[56] The data for the Fama-French and momentum factors were obtained from the Kenneth French website.

(which requires a minimum of 20 observations).[57] The idiosyncratic risk is the standard deviation of a fund's residuals, when estimating the CAPM model.

We observe an unclear pattern on the effect a given organizational structure to the fund performance and idiosyncratic risk for conventional funds whereas individual management structures affect positively to SRI funds. For example for conventional funds, we find weak evidence (only Carhart's alpha) of superior performance for team-management in the entire sample and weak superior performance (only alpha from 9 factor) for individual-management in the first sample and only strong evidence in the second sample. Differences in idiosyncratic risk also changes depending on the sample period. On the other hand, we observe a clear pattern in SRI funds, where independently of the sample period and the measure used, individual management structures lead to higher performance. These portfolios managed by individuals are also more concentrated in terms of specific risk.

These results might be driven by the fact that we do not observe the level of portfolio constrained of conventional funds. It might be cases in which a fund prospectus restricts the investments to a single sector or to a given investment objective. Thus, under some circumstances individual management can be preferred over team-managed structures. However, SRI funds are clearly more restricted portfolios in which individual management is more beneficial in terms of fund performance as this structures benefit from avoiding coordination costs.

[57] The main results remain unchanged when using a wider window of 36 months instead of 24 to estimate fund performance.

Figure 1
Conventional and SRI funds over time

Figure 1 displays the number of total funds and the average TNA (total net of assets) per funds from 1996 to 2011. Funds are classified attending to two different criterions. First, whether they are conventional or Socially Responsible investment portfolios and second based on their management organizational structure (Individual portfolio manager vs Team management). TNA is expressed in millions.

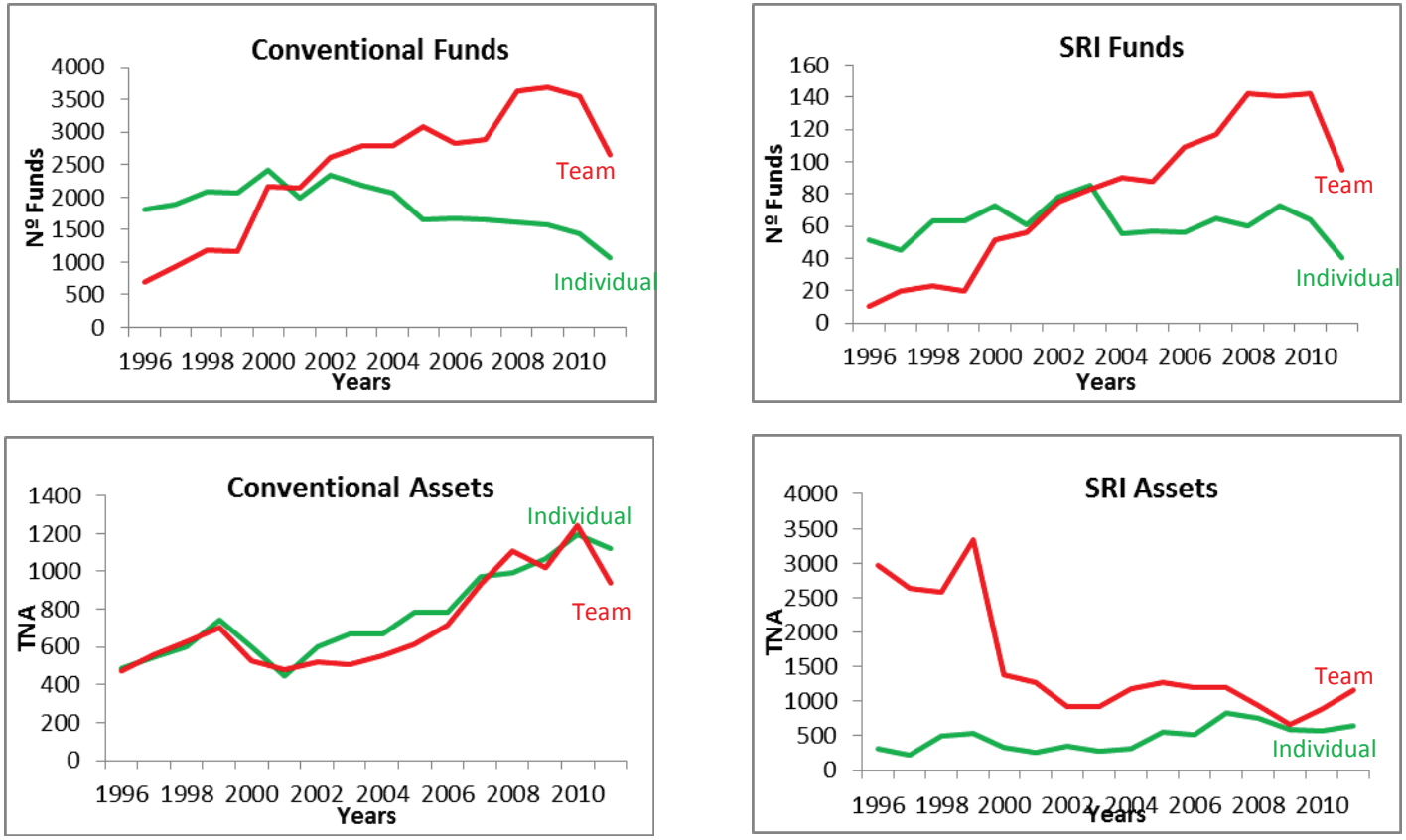

Table 1
Summary of Fund and Manager Characteristics

This table presents the average of fund (Panel A) and portfolio manager (Panel B) characteristics across all U.S equity open-end funds for the period January 1996 to December 2011. Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since inception. Expenses are total annual expenses and fees divided by year-end TNA. Fee 12b-1 is the annual marketing and distribution fee of the fund. Back and Front loads are expressed as percentages of new investments. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Flow is a percentage that represents new inflows into the fund over the previous year. The Company Fund variable indicates the logarithm of the number of funds in the family, excluding the fund itself. Company Size is the logarithm of TNA for all funds in the family, excluding the fund itself. Ivy League, MBA, PHD and CFA represent the percentage of managers on conventional and Sri Funds with that degree. Company background is the number of prior job positions of the manager. Business and Quantitative studies account for the major background of the manager, and experience is the number of years since the manager graduated. The last two columns display the difference between Conventional and SRI funds and the P-value associated to that difference.

	Conventional	SRI	Difference	P-value
		Panel A		
		General Variables		
Size (log TNA)	4.2739	4.3419	-0.0679	0.00
Age	9.7352	9.9642	-0.229	0.00
Expenses	1.1369	1.2899	-0.153	0.00
Fee 12b-1	0.2092	0.2394	-0.0302	0.00
Back load	0.317	0.4751	-0.1581	0.00
Front load	1.2389	1.2649	-0.026	0.02
Turnover	1.014	0.8889	0.1251	0.00
Flows	0.4296	0.3114	0.1182	0.00
Monthly Returns	0.5064	0.5909	-0.0845	0.00
Company Funds	45.7824	26.3016	19.4808	0.00
Company Size	8.9514	8.0284	0.9229	0.00
		Panel B		
		Portfolio Manager level		
Ivy league	0.208	0.2639	-0.056	0.00
MBA	0.4534	0.4736	-0.0203	0.00
PHD	0.0287	0.0571	-0.0285	0.00
CFA	0.0835	0.0493	0.0342	0.00
Company Background	2.4098	2.4788	-0.069	0.00
Business Studies	0.8206	0.7521	0.0685	0.00
Quantitative Studies	0.0404	0.0995	-0.0591	0.00
Experience	19.4078	23.3621	-3.9543	0.00

Table 2
Individual vs Team managed funds

This table presents the average values of fund performance (alpha from using the Carhart and 9F models) and the idiosyncratic risk (standard deviation of the residual from CAPM model) sorted by management structures. First column represents those funds managed by an individual manager and second column that of team managed ones. We also report the difference and statistical significance by groups of Conventional and Socially Responsible Investment funds based on the full-sample period as well as sub-periods (1996–2004 and 2005–2011). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Individual-Managed	Team-Managed	Difference
Panel A: Entire sample 1996-2011		Conventional Funds	
Alpha Carhart	0.0491	0.0647	-0.0155***
Alpha 9F	0.0227	0.0219	0.0009
Idiosyncratic Risk	0.0170	0.0169	0.0001*
Average of funds per year	1846	2427	
		SRI Funds	
Alpha Carhart	0.1056	0.0794	0.0262***
Alpha 9F	0.1095	0.0425	0.0670***
Idiosyncratic Risk	0.0237	0.0183	0.0054***
Average of funds per year	62	79	
Panel B: 1st Period 1996-2004		Conventional Funds	
Alpha Carhart	0.0208	0.0183	0.0025
Alpha 9F	-0.0137	-0.0319	0.0183***
Idiosyncratic Risk	18.338	20.848	-0.2510***
		SRI Funds	
Alpha Carhart	0.1057	0.0853	0.0204**
Alpha 9F	0.1143	0.0578	0.0565***
Idiosyncratic Risk	28.845	21.482	0.7363***
Panel C: 2ND Period 2005-2011		Conventional Funds	
Alpha Carhart	0.1233	0.1038	0.0196***
Alpha 9F	0.1012	0.0645	0.0367***
Idiosyncratic Risk	15.557	14.322	0.1234***
		SRI Funds	
Alpha Carhart	0.1357	0.0779	0.0578***
Alpha 9F	0.1366	0.0354	0.1013***
Idiosyncratic Risk	18.211	16.763	0.1449***

In Table 3, we present some preliminary results about difference on fund performance based on management structures (Team vs Individual) and investment policy (SRI vs Conventional), considering different levels of idiosyncratic risk (RSD is the standard deviation of a fund's residuals, when estimating the CAPM model) and investment screenings. Panel A shows that SRI funds generally outperform Conventional funds. The greatest difference comes from funds managed individually and with high levels of idiosyncratic risks. In Panel B, we observe that individual managed funds outperform the team managed peer, especially in SRI funds with high levels of idiosyncratic risk. In Panel C and D, we also show the importance of the screening investment criterion of SRI funds. Under high levels of screening investment restrictions, funds managed by an individual manager outperform their team-managed peers. Overall, this table suggests that SRI funds are better managed when they are under a single mandates, especially on funds with high levels idiosyncratic risks and a more restricted opportunity set of investment.

Table 3
SRI Screens and Individual managed funds

This table presents the fund performance differences between group of funds sorted as follows on each panel: Panel A compares SRI versus Conventional funds for Individual and Team managed structures by high and low levels of (RSD) idiosyncratic risk (forth and first quartiles of the standard deviation of the residuals from estimating the CAPM model, respectively). Panel B compares the performance of individual and team-managed of SRI and Conventional funds for High and Low levels of idiosyncratic risk. Panel C displays the performance difference between difference levels of screening investments for individual and team managed structures. Screening levels are grouped according to the proportion of screening criterions into the forth quartile (high) or first quartile (low). Screening proportion is the ratio between the number of social investment screening of the fund and the total of screening available. Panel D difference in performance between Individual and Team structures of High and Low levels of screening social investments.

	High RSD		Low RSD	
	Panel A			
Difference Fund Performance	Individual	Team	Individual	Team
SRI vs Conventional	0.1628***	0.0603***	0.0375***	0.0021
	Panel B			
Difference Fund Performance	SRI	Conventional	SRI	Conventional
Individual Vs Team	0.1184***	0.0159***	0.0378***	0.0024*

Panel C		
Difference Fund Performance	Individual	Team
High vs No-High Screening	0.1352***	-0.0312
Low vs No-Low Screening	-0.0044	-0.0450**
High vs Low Screening	0.1108***	0.0060
Panel D		
Difference Fund Performance	High Screening	Low Screening
Individual Vs Team	0.1603***	0.0555**

4. Methodology and Empirical Results

Our empirical strategy utilizes cross-sectional variation to see how fund performance varies with management structure and investment constrains. There are few major worries that arise, however, when using cross-sectional variation. The first is that funds of different organizational structure may be in different styles. For instance, individual managed funds might be more likely than team-managed funds to pursue small stock, value stock, and price momentum strategies, which have been documented to generate abnormal returns. While it is not clear that one necessarily wants to adjust for such heterogeneity, it would be more interesting if we found that organizational structure in SRI funds influences performance even after accounting for variations in fund styles. The second worry is that organization structure might be correlated with other fund characteristics such as fund age or turnover, and it may be these characteristics that are driving performance.

For instance, individual-managed funds may be measuring whether a fund is relatively small and thus does not need from a team to be managed and if it turns out that small funds happen to perform better, this might be leading to spurious results. Therefore, fund performance on whether the funds are classified as SRI or Conventional, organizational structures and fund and family characteristics as well as including time and fund style dummies.

In this section, we first test how fund type and organizational structure affect fund performance separately and then we examine what is the effect of their combination.

4.1.Separated tests for Socially Responsible Investment and Organizational Structures.

First, to test for SRI fund efficiency, we estimate differences in performance due to fund type (SRI vs Conventional) from the following pooled OLS regression at monthly frequency:

$$Performance_{jt} = \beta_0 + \beta_1 SRI_j + \beta_2 X_{jt-12} + \varepsilon_{jt} \quad [1]$$

where Performance is the risk-adjusted return of fund j in month t, β_0 is the intercept, SRI_j is a dummy variable indicating whether fund j is a socially responsible investment fund, and X_{jt-12} is a set of control variables previously described referring to the prior year. The subscript j corresponds to all U.S. open-end funds in our sample.

Table 4 - Panel B presents the results of equation [1] in each the dependent variable fund performance is either the alpha from Carhart's 4 factor model and a 9-Factor model previously defined. Time and Investment Style dummies are also included in the last two columns. Standard errors are clustered at fund level. We find weak evidence of SRI funds outperforming Conventional portfolios. This result seems to be driven by specific investment objectives or time periods. When controlling for both factors, the performance of SRI funds turn to be indifferent from that of Conventional funds.

Secondly, we estimate differences in performance between funds managed under individual portfolio manager structures and team management ones. To do that, we estimate the following pooled OLS regression at monthly frequency:

$$Performance_{jt} = \beta_0 + \beta_1 Individual_j + \beta_2 X_{jt-12} + \varepsilon_{jt} \quad [2]$$

Where the only difference with the equation [1] is the main variable of interest $Individual_j$, that is a dummy variable that equals 1 if the fund is managed by a single individual portfolio manager and 0 if the fund is under a team-management structure.

Table 4 - Panel B presents the estimated results of equation [2]. While including only fund style dummies team-management appears to be more effective than individual management in terms of performance as measured with the Carhart's model, when considering time dummies as well, individual managed portfolios outperform those managed by a team.

Table 4: Socially Responsible Investment, Management Structure and Performance (I)

This table presents results for monthly pooled OLS regressions estimates of risk-adjusted returns on fund characteristics. In Panel A, we compare the performance between SRI and Conventional funds and in Panel B we examine performance differences between individual and team management structures. The sample contains the U.S. open-end mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by alpha, as given by Carhart's four-factor (Alpha Carhart) model and including five additional factors (Alpha 9F). SRI is a dummy variable that equals 1 if the fund is a Social Responsible Investment and 0 otherwise. Individual is a dummy variable that equals 1 if the fund is managed by an individual portfolio manager and 0 otherwise. Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since the fund's inception. Expenses are total annual expenses and fees divided by year-end TNA. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Flows is a percentage that represents new inflows into a fund over the previous year. Company Funds is the natural logarithm of the number of funds in a fund family. Company Size is the logarithm of TNA of all funds in a fund family, excluding the fund itself. Control variables are lagged 12 months. Time and Investment Style dummies are included but not reported; and the constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Panel A: SRI vs Conventional Funds						Panel B: Individual vs Team Managed Funds					
	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F
SRI	0.0313*	0.0429*	0.0423**	0.0322	0.0267	0.0228						
	(1.80)	(1.72)	(2.49)	(1.29)	(1.57)	(0.90)						
Individual							-0.0028	0.0047	-0.0133**	0.0101	0.0296***	0.0344***
							(-0.45)	(0.63)	(-2.05)	(1.28)	(4.59)	(4.43)
Size (log TNA)	0.0082***	0.0138***	0.0121***	0.0120***	0.0173***	0.0142***	0.0085***	0.0142***	0.0126***	0.0123***	0.0176***	0.0145***
	(4.60)	(6.45)	(6.74)	(5.56)	(9.87)	(6.67)	(4.76)	(6.63)	(7.01)	(5.68)	(10.05)	(6.81)
Age	0.0001	-0.0004	-0.0002	-0.0003	-0.0016***	-0.0012**	0.0002	-0.0004	-0.0002	-0.0003	-0.0017***	-0.0014***
	(0.30)	(-0.84)	(-0.58)	(-0.63)	(-3.73)	(-2.34)	(0.36)	(-0.80)	(-0.47)	(-0.64)	(-3.92)	(-2.60)
Expenses	-0.0050	0.0550***	0.0246***	0.0396***	0.0327***	0.0436***	-0.0048	0.0555***	0.0256***	0.0400***	0.0329***	0.0433***
	(-0.60)	(6.10)	(2.83)	(4.31)	(3.91)	(4.85)	(-0.57)	(6.14)	(2.94)	(4.34)	(3.93)	(4.81)
Turnover	0.0039**	0.0017	0.0037**	0.0007	0.0012	0.0006	0.0039**	0.0018	0.0036*	0.0008	0.0013	0.0007
	(2.02)	(0.78)	(1.96)	(0.33)	(0.66)	(0.26)	(2.01)	(0.81)	(1.92)	(0.36)	(0.75)	(0.33)
Flows	0.0034*	0.0074***	0.0033	0.0077***	0.0063***	0.0073***	0.0040*	0.0076***	0.0038*	0.0079***	0.0074***	0.0078***
	(1.67)	(3.61)	(1.62)	(3.73)	(3.17)	(3.75)	(1.77)	(3.32)	(1.73)	(3.44)	(3.37)	(3.61)
Company Funds	0.0005***	0.0007***	0.0006***	0.0006***	0.0004***	0.0007***	0.0005***	0.0007***	0.0006***	0.0006***	0.0004***	0.0006***
	(4.82)	(5.70)	(5.74)	(5.31)	(4.29)	(5.33)	(4.91)	(5.68)	(6.05)	(5.18)	(3.55)	(4.69)
Company Size	-0.0031	-0.0049*	-0.0048**	-0.0033	-0.0069***	-0.0069**	-0.0037*	-0.0053**	-0.0059***	-0.0033	-0.0063***	-0.0060**
	(-1.42)	(-1.83)	(-2.17)	(-1.21)	(-3.14)	(-2.56)	(-1.67)	(-1.97)	(-2.64)	(-1.23)	(-2.88)	(-2.23)
Style dummies	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Time dummies	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Observations	476439	476439	476439	476439	476439	476439	472207	472207	472207	472207	472207	472207
Adjusted R^2	0.003	0.004	0.007	0.007	0.041	0.029	0.003	0.004	0.008	0.007	0.041	0.030

4.2.Join test for Socially Responsible Investment and Organizational Structures.

Prior results, give us a first flavor of how different fund type and organizational structures can affect the performance of these portfolios. Since we claim that a type or a structure might not be generally preferred over the other but only under certain circumstances, we are not interest on how this features work separately but jointly. That is to say, how the interaction of these variables affect the fund efficiency. In other word, we want to test whether SRI portfolios will be more efficiently managed from the performance point of view, when they are under an individual management structure instead of under a team one. Then, to test our second hypothesis we have to estimate the following pooled OLS regression at monthly frequency:

$$Performance_{jt} = \beta_0 + \beta_1 Individual_j + \beta_2 Individual_j * SRI_j + \beta_3 SRI_j + \beta_4 X_{jt-12} + \varepsilon_{jt} \quad [3]$$

In Table 5, we show the estimates of equation [3] for all the U.S. open-end mutual funds from 1996 to 2011. Socially Responsible Investment Funds do not seems to differ from conventional funds in performance and similarly with individual managed portfolios that only better than team-managed when considering style and time dummies. β_2 is positive and statistically significant across all the different specifications, showing that SRI funds are better managed when they have an individual structure of management. Consistent with our first hypothesis, individually managed funds outperform the SRI funds managed by team between 78.48 and 105.96 bps per year.

To be more conservative, in Table 6 we replicate the estimation of equation [3] but applying Fama-MacBeth (1973) and family fixed effect approach. Family fixed effects, allow us to compare specifically differences in performance of SRI funds between individual and team-managed one that belongs to the same family. We observe that SRI fund do not differ in terms of performance from the Conventional funds in general, but those SRI funds that are managed individually have between 47.4 and 116.76 bps per year more than other SRI funds. These results confirm our first hypothesis that SRI funds being managed by individuals do indeed improve performance relatively to other funds

Table 5
Socially Responsible Investment, Management Structure and Performance (II)

This table presents results for monthly pooled OLS regressions estimates of risk-adjusted returns on fund characteristics. The sample contains the U.S. open-end mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by alpha, as given by Carhart's four-factor (Alpha Carhart) model and including five additional factors (Alpha 9F). SRI is a dummy variable that equals 1 if the fund is a Social Responsible Investment and 0 otherwise. Individual is a dummy variable that equals 1 if the fund is managed by an individual portfolio manager and 0 otherwise. Iteration term of these variables is also included to capture the combination effect on performance. Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since the fund's inception. Expenses are total annual expenses and fees divided by year-end TNA. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Flows is a percentage that represents new inflows into a fund over the previous year. Company Size is the logarithm of TNA of all funds in a fund family, excluding the fund itself. Control variables are lagged 12 months. Time and Investment Style dummies are included but not reported; and the constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F
Individual * SRI	0.0654**	0.0753*	0.0669**	0.0742*	0.0784***	0.0883**
	(2.26)	(1.81)	(2.34)	(1.80)	(2.70)	(2.14)
Individual	-0.0064	0.0051	-0.0172***	0.0107	0.0250***	0.0328***
	(-1.02)	(0.66)	(-2.68)	(1.34)	(3.91)	(4.21)
SRI	0.0019	0.0102	0.0130	-0.0006	-0.0098	-0.0187
	(0.10)	(0.47)	(0.68)	(-0.03)	(-0.51)	(-0.85)
Size (log TNA)	0.0084***	0.0140***	0.0124***	0.0121***	0.0176***	0.0145***
	(4.66)	(6.48)	(6.90)	(5.58)	(9.99)	(6.75)
Age	0.0002	-0.0004	-0.0002	-0.0003	-0.0016***	-0.0013***
	(0.36)	(-0.82)	(-0.49)	(-0.64)	(-3.89)	(-2.60)
Expenses	-0.0055	0.0550***	0.0251***	0.0396***	0.0325***	0.0432***
	(-0.65)	(6.08)	(2.88)	(4.31)	(3.88)	(4.79)
Turnover	0.0039**	0.0018	0.0036*	0.0009	0.0014	0.0008
	(2.02)	(0.84)	(1.93)	(0.40)	(0.78)	(0.37)
Flows	0.0040*	0.0076***	0.0038*	0.0078***	0.0074***	0.0078***
	(1.77)	(3.31)	(1.74)	(3.43)	(3.36)	(3.60)
Company Funds	0.0005***	0.0007***	0.0006***	0.0006***	0.0004***	0.0006***
	(5.02)	(5.71)	(6.18)	(5.18)	(3.68)	(4.72)
Company Size	-0.0037*	-0.0051*	-0.0059***	-0.0032	-0.0063***	-0.0060**
	(-1.67)	(-1.88)	(-2.64)	(-1.16)	(-2.90)	(-2.20)
Style dummies	No	No	Yes	Yes	Yes	Yes
Time dummies	No	No	No	No	Yes	Yes
Observations	471886	471886	471886	471886	471886	471886
Adjusted R^2	0.003	0.005	0.008	0.007	0.041	0.030

Table 6
Socially Responsible Investment, Management Structure and Performance (Robustness Checks)

This table presents results for monthly Fama-MacBeth (1973) and family fixed effect regressions estimates of risk-adjusted returns on fund characteristics. The sample contains the U.S. open-end mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by alpha, as given by Carhart's four-factor (Alpha Carhart) model and including five additional factors (Alpha 9F). SRI is a dummy variable that equals 1 if the fund is a Social Responsible Investment and 0 otherwise. Individual is a dummy variable that equals 1 if the fund is managed by an individual portfolio manager and 0 otherwise. Iteration term of these variables is also included to caputure the combination effect on performance. Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since the fund's inception. Expenses are total annual expenses and fees divided by year-end TNA. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Flows is a percentage that represents new inflows into a fund over the previous year. Company Funds is the natural logarithm of the number of funds in a fund family. Company Size is the logarithm of TNA of all funds in a fund family, excluding the fund itself. Control variables are lagged 12 months. Time and Investment Style dummies are included but not reported; and the constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987) lags of order three). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fama McBeth		Family Fixed Effect	
	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F
Individual * SRI	0.0395**	0.0575*	0.0772**	0.0973*
	(2.20)	(1.95)	(2.24)	(1.74)
Individual	0.0234***	0.0223***	0.0288***	0.0347***
	(5.08)	(4.24)	(3.24)	(3.43)
SRI	0.0272**	0.0219	0.0144	0.0461
	(2.26)	(1.53)	(0.53)	(1.19)
Size (log TNA)	0.0114***	0.0094***	0.0140***	0.0100***
	(6.68)	(3.61)	(5.87)	(3.72)
Age	-0.0010*	-0.0015***	-0.0011***	-0.0005
	(-1.83)	(-3.78)	(-2.62)	(-0.91)
Expenses	0.0131	0.0392***	0.0507***	0.0566***
	(0.85)	(3.48)	(3.86)	(3.82)
Turnover	0.0083**	0.0131**	0.0027	0.0005
	(1.99)	(2.40)	(0.72)	(0.18)
Flows	0.0982***	0.0960***	0.0059	0.0060*
	(7.96)	(5.10)	(1.59)	(1.96)
Company Funds	0.0005***	0.0006***	0.0006	0.0004
	(4.52)	(5.07)	(1.26)	(1.07)
Company Size	-0.0051	-0.0051*	-0.0077	-0.0107
	(-1.45)	(-1.92)	(-0.98)	(-1.32)
Style dummies	Yes	Yes	Yes	Yes
Time dummies	No	No	Yes	Yes
Observations	471886	471886	471886	471886
Adjusted R^2	0.085	0.071	0.101	0.088

4.3.SRI Screens and the performance of Individual managed funds.

Since no all the Socially Responsible Investment funds are managed under the same investment restrictions, in this section we estimate the following equation for all the U.S SRI funds that are managed by an individual portfolio manager:

$$Performance_{jt} = \beta_0 + \beta_1 Screening\ Level_j + \beta_2 X_{jt-12} + \varepsilon_{jt} \quad [4]$$

Where $Screening\ Level_j$ measures the high and low levels of the ratio between the number of social investment screening of the fund j and the total of screening available. High Screening will be a dummy variable that equals 1 if the fund screening proportion is within the fourth quartile of fund style and date and Low Screening is a dummy variable that equals 1 if the fund screening proportion is within the first quartile of fund style and date. Table 7 presents results for monthly pooled OLS regressions estimates of the equation [4]. While SRI funds managed by an individual manager under a low level of investment restriction do not differ in performance from other similar funds, those managed with high levels of investment screenings outperform between 216.7 and 229.2 bps per year. This result is consistent with our second hypothesis that SRI funds managed by individuals facing high levels of social screening investments are better managed than those SRI funds managed by individuals with more relaxed screening criterion.

Table 7
SRI Screens and the performance of Individual managed funds

This table presents results for monthly pooled OLS regressions estimates of risk-adjusted returns on fund characteristics. The sample contains the U.S. open-end SRI mutual funds managed by individual portfolio managers from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by alpha, as given by Carhart's four-factor plus five additional factors. High Screening is a dummy variable that equals 1 if the fund screening proportion is within the fourth quartile of fund style and date. Low Screening is a dummy variable that equals 1 if the fund screening proportion is within the first quartile of fund style and date. Screening proportion is the ratio between the number of social investment screening of the fund and the total of screening available. Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since the fund's inception. Expenses are total annual expenses and fees divided by year-end TNA. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Flows is a percentage that represents new inflows into a fund over the previous year. Company Funds is the natural logarithm of the number of funds in a fund family. Company Size is the logarithm of TNA of all funds in a fund family, excluding the fund itself. Control variables are lagged 12 months. Time and Investment Style dummies are included but not reported; and the constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Performance of Individual SRI Funds					
High Screening	0.1806**		0.1825*		0.1910**	
	(2.20)		(1.94)		(2.19)	
Low Screening		0.1138		0.0767		0.0851
		(1.18)		(0.72)		(0.82)
Size (log TNA)	0.0056	0.0001	0.0097	0.0080	0.0038	0.0027
	(0.26)	(0.00)	(0.43)	(0.36)	(0.18)	(0.13)
Age	-0.0028	0.0009	-0.0036	-0.0001	-0.0027	0.0011
	(-0.63)	(0.19)	(-0.87)	(-0.03)	(-0.69)	(0.22)
Expenses	-0.0087	-0.0070	0.0586	0.0646	0.0821	0.0815
	(-0.16)	(-0.13)	(0.87)	(0.95)	(0.98)	(0.96)
Turnover	0.0161*	0.0172**	0.0181*	0.0169*	0.0248***	0.0226***
	(1.96)	(2.34)	(1.91)	(1.77)	(3.32)	(2.92)
Flows	0.0076	0.0050	0.0074	0.0057	0.0060	0.0047
	(1.01)	(0.63)	(0.98)	(0.71)	(0.84)	(0.61)
Company Funds	0.0034	0.0007	0.0033	0.0014	0.0021	0.0001
	(1.29)	(0.30)	(1.23)	(0.55)	(0.80)	(0.04)
Company Size	-0.0162	-0.0035	-0.0107	-0.0028	-0.0026	0.0068
	(-0.47)	(-0.11)	(-0.30)	(-0.08)	(-0.07)	(0.19)
Style dummies	No	No	Yes	Yes	Yes	Yes
Time dummies	No	No	No	No	Yes	Yes
Observations	2958	2958	2958	2958	2958	2958
Adjusted R^2	0.012	0.007	0.029	0.022	0.086	0.079

4.4.Socially Responsible Investment, Management Structure and Idiosyncratic Risk.

Portfolios managed by an individual manager are more likely to be more concentrated as they do not benefit from the diversification of opinions of team decisions. Additionally, SRI funds are meant to follow an investment policy that implies building a more restricted portfolio. Taking altogether, one might argue that the greater performance of SRI funds managed under a single mandate comes from holding riskier portfolios (higher idiosyncratic risk) based on Merton's Theory for undiversified portfolios (1987). To rule out this alternative interpretation, we replicate the estimation of equation [3] for two different subsamples: portfolios with high and low levels of idiosyncratic risk.

In Table 8 we effectively confirm that while funds managed by an individual manager hold risky portfolios in general, if the portfolio is under SRI policy the fund is even riskier. However Table 9 shows that, independently of whether the funds is within the highest quartile of idiosyncratic risk (RSD is the standard deviation of a fund's residuals, when estimating the CAPM model) in Panel A and within the lowest one in Panel B, SRI funds managed by solo portfolio manager, outperform between 62.88 and 169.3 bps per year. This is consistent with what we claim in hypothesis 3 and thus, we confirm that even though SRI funds managed by individuals are under higher levels of specific risk, this behavior is not driving their superior performance.

4.5.Socially Responsible Investment, Management Structure and Fund Flows.

In this section we try to examine how investors react to these different investment policies and managerial structures and whether they are sophisticated enough to learn about higher performance on SRI funds managed by individuals. To test for that we estimate the following equation:

$$Fund\ Flows_{jt} = \beta_0 + \beta_0 + \beta_1 Individual_j + \beta_2 Individual_j * SRI_j + \beta_3 SRI_j + \beta_4 X_{jt-12} + \varepsilon_{jt} \quad [5]$$

Where the dependent variable $Fund\ Flows_{jt}$ represents new inflows into the fund j in time t. SRI is a dummy variable that equals 1 if the fund is a Social Responsible Investment and

0 otherwise. Individual is a dummy variable that equals 1 if the fund is managed by an individual portfolio manager and 0 otherwise. Iteration term of these variables is also included to capture the combination effect on performance. X_{jt-12} is a set of control variables described in prior sections and are all lagged 12 months. Time and Investment Style dummies are included but not reported. Standard errors are clustered at fund level; t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987) lags of order three).

Table 10 reports the estimates of equation [5] for monthly Pooled OLS, Fama-MacBeth (1973) and family fixed effect regressions. Consistent with our forth hypothesis, this Table shows that flows on SRI funds managed by individuals are greater than other funds across the three different approaches. Thus, Social concern investors will bet for individual managers in which they can trust more rather than in anonymous teams. So these funds will receive more flows.

Table 8
Socially Responsible Investment, Management Structure and Idiosyncratic Risk

This table presents results for monthly pooled OLS regressions estimates of idiosyncratic risk on fund characteristics. The sample contains the U.S. open-end mutual funds from 1996 to 2011. The dependent variable is the specific or idiosyncratic risk, which is measured by the standard deviation of the residual obtained when estimating the CAPM model. SRI is a dummy variable that equals 1 if the fund is a Social Responsible Investment and 0 otherwise. Individual is a dummy variable that equals 1 if the fund is managed by an individual portfolio manager and 0 otherwise. Iteration term of these variables is also included to capture the combination effect on the dependent variable. Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since the fund's inception. Expenses are total annual expenses and fees divided by year-end TNA. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Flows is a percentage that represents new inflows into a fund over the previous year. Company Funds is the natural logarithm of the number of funds in a fund family. Company Size is the logarithm of TNA of all funds in a fund family, excluding the fund itself. Control variables are lagged 12 months. Time and Investment Style dummies are included but not reported; and the constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Idiosyncratic Risk		
Individual * SRI	0.3817**	0.3556**	0.3154**
	(2.30)	(2.25)	(2.11)
Individual	0.0930***	0.1941***	0.1044***
	(3.56)	(7.89)	(4.29)
SRI	-0.0368	-0.1239	-0.0751
	(-0.31)	(-1.04)	(-0.65)
Size (log TNA)	0.0892***	0.0459***	0.0420***
	(11.46)	(6.45)	(6.03)
Age	-0.0136***	-0.0087***	-0.0036**
	(-7.82)	(-5.63)	(-2.22)
Expenses	1.0485***	0.6614***	0.6676***
	(32.14)	(22.27)	(23.01)
Turnover	0.0661***	0.0621***	0.0571***
	(7.43)	(7.57)	(7.14)
Flows	0.0066	0.0081	0.0067
	(1.24)	(1.64)	(1.43)
Company Funds	0.0021***	0.0008	0.0013**
	(3.91)	(1.59)	(2.55)
Company Size	-0.0242**	0.0007	0.0042
	(-2.50)	(0.07)	(0.47)
Style dummies	No	Yes	Yes
Time dummies	No	No	Yes
Observations	471886	471886	471886
Adjusted R^2	0.157	0.248	0.342

Table 9
Socially Responsible Investment, Management Structure and Idiosyncratic Risk

This table presents results for monthly pooled OLS regressions estimates of risk-adjusted returns on fund characteristics. The sample contains the U.S. open-end mutual funds from 1996 to 2011 and is distributed in two Panels, A for funds within the highest quartile of idiosyncratic risk and B for the lowest one. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by alpha, as given by Carhart's four-factor (Alpha Carhart) model and including five additional factors (Alpha 9F). SRI is a dummy variable that equals 1 if the fund is a Social Responsible Investment and 0 otherwise. Individual is a dummy variable that equals 1 if the fund is managed by an individual portfolio manager and 0 otherwise. Iteration term of these variables is also included to capture the combination effect on performance. Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since the fund's inception. Expenses are total annual expenses and fees divided by year-end TNA. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Flows is a percentage that represents new inflows into a fund over the previous year. Company Funds is the natural logarithm of the number of funds in a fund family. Company Size is the logarithm of TNA of all funds in a fund family, excluding the fund itself. Control variables are lagged 12 months. Time and Investment Style dummies are included but not reported; and the constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Panel A: High RSD		Panel B: Low RSD	
	Alpha Carhart	Alpha 9F	Alpha Carhart	Alpha 9F
Individual * SRI	0.0524*	0.0719**	0.1146*	0.1411*
	(1.95)	(2.29)	(1.74)	(1.77)
Individual	0.0096	0.0191**	0.0394**	0.0391*
	(1.25)	(2.05)	(2.36)	(1.94)
SRI	-0.0115	-0.0206	0.0073	-0.0040
	(-0.61)	(-1.02)	(0.13)	(-0.07)
Size (log TNA)	0.0063***	0.0081***	0.0327***	0.0228***
	(3.55)	(3.60)	(6.89)	(4.02)
Age	0.0001	0.0002	-0.0043***	-0.0035*
	(0.10)	(0.57)	(-2.72)	(-1.80)
Expenses	-0.0070	0.0083	0.0404*	0.0506**
	(-0.87)	(0.94)	(1.95)	(2.38)
Turnover	0.0025	-0.0003	-0.0026	-0.0026
	(0.65)	(-0.07)	(-0.88)	(-0.76)
Flows	0.0005	0.0006	0.0067	0.0068
	(0.60)	(0.57)	(1.54)	(1.44)
Company Funds	0.0000	0.0002*	0.0005**	0.0010***
	(0.16)	(1.75)	(2.32)	(3.48)
Company Size	-0.0045*	-0.0065**	0.0004	-0.0007
	(-1.76)	(-2.05)	(0.07)	(-0.10)
Style dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	88777	88777	131655	131655
Adjusted R^2	0.078	0.075	0.060	0.058

Table 10: Socially Responsible Investment, Management Structure and Fund Flows

This table presents results for monthly Pooled OLS, Fama-MacBeth (1973) and family fixed effect regressions estimates of fund flows on fund characteristics. The sample contains the U.S. open-end mutual funds from 1996 to 2011. The dependent variable is the Fund Flows that represents new inflows into the fund. SRI is a dummy variable that equals 1 if the fund is a Social Responsible Investment and 0 otherwise. Individual is a dummy variable that equals 1 if the fund is managed by an individual portfolio manager and 0 otherwise. Iteration term of these variables is also included to capture the combination effect on performance. Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since the fund's inception. Expenses are total annual expenses and fees divided by year-end TNA. 12b-1 fee is the annual marketing and distribution fee rate, Front and Back loads are the subscription and redemption fee of the funds expressed as a percentage of TNA. Past Flows is a percentage that represents new inflows into a fund over the previous year. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Past Performance is a fund's past year's risk-adjusted return. Company Funds is the natural logarithm of the number of funds in a fund family. Company Size is the logarithm of TNA of all funds in a fund family, excluding the fund itself. Control variables are lagged 12 months. Time and Investment Style dummies are included but not reported; and the constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses (adjusted for serial correlation using Newey-West (1987) lags of order three). * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Fund Flows		
	Pooled OLS	Fama McBeth	Family FE
Individual * SRI	0.1947**	0.0495*	0.1236*
	(2.18)	(1.66)	(1.80)
Individual	-0.0419*	-0.0834***	-0.0281
	(-1.69)	(-2.65)	(-0.73)
SRI	-0.1431**	-0.0161	-0.0661
	(-2.10)	(-0.46)	(-0.52)
Size (log TNA)	-0.2485***	-0.2092***	-0.2505***
	(-17.26)	(-3.76)	(-7.58)
Age	0.0093***	0.0056***	0.0095***
	(6.73)	(3.16)	(4.19)
Expenses	-0.1762***	-0.1762***	-0.1272*
	(-4.72)	(-3.00)	(-1.87)
12b-1 fee	0.6559***	0.6114***	0.5078***
	(10.38)	(3.10)	(3.79)
Front Load	0.0092	0.1169*	-0.0109
	(0.34)	(1.74)	(-0.26)
Back Load	-0.0506***	-0.0503***	-0.1115***
	(-6.14)	(-3.02)	(-4.79)
Turnover	0.0058	0.0229	0.0097
	(0.75)	(1.26)	(1.02)
Past Flows	0.2747***	-0.3441	0.2760***
	(6.30)	(-1.62)	(5.74)
Past Performance	-0.0011***	-0.0006**	-0.0028
	(-3.01)	(-1.98)	(-1.33)
Company Funds	0.0870***	0.0763***	0.0243
	(8.33)	(3.45)	(0.52)
Company Size	0.0066***	0.0031*	0.0083***
	(4.16)	(1.74)	(3.80)
Style dummies	Yes	Yes	Yes
Time dummies	Yes	No	Yes
Observations	217395	217395	217395
Adjusted R^2	0.051	0.058	0.062

4.6.Determinants of individual managed SRI funds.

In this section, we analyze the fund and manager characteristics of SRI funds managed by individual portfolio managers. In order to run this test, we estimate the following logistic model:

$$\text{Prob}(y_{i,t} = 1) = \frac{\exp(\beta_f z_i)}{1+\exp(\beta_f z_i)}, \quad [6]$$

Where

$\beta_f z_i = (a_0 + a_1 Manager\ Characteristics_{j,t-1} + a_2 Portfolio\ Loadings_{j,t-1} + a_3 X_{i,t-12} + e_{i,t})$. The dependent variable ($y_{i,t}$) is a dummy variable equals 1 for SRI funds managed by individual portfolio managers. $Manager\ Characteristics_{j,t-1}$ accounts for the following portfolio manager background: MBA, PHD, Business and Quantitative studies that are indicators for manager's degree. Company background indicates the number of prior positions of the manager and Experience is the number of years since the manager first graduated. $Portfolio\ Loadings_{j,t-1}$ consists on MKT, SMB, HML and WML that are the risk factors from the Carhart's model and ST Bond, INT Bond, LT Bond, HY Bond and IG Bond that are the additional factors of the 9F model presented earlier. The remaining variables are previously defined and are included on $X_{i,t-12}$.

Table 11 report the coefficient, t-statistic and marginal effects from estimating the equation [6]. Portfolio managers in charge of SRI funds are more likely to be graduated from a top university, hold a PhD and have a quantitative background. These portfolios have a greater market loading and hold less long term bonds.

Table 11
Determinants of individual managed SRI funds

This table presents the monthly logistic regressions of SRI funds managed by individual portfolio managers on managers and fund characteristics. The sample contains all U.S. equity and fixed income mutual funds managed by a single portfolio manager from 1996 to 2011. MBA, PHD, Business and Quantitative studies are indicators for manager's degree. Company background indicates the number of prior positions of the manager. Experience is the number of years since the manager first graduated. MKT, SMB, HML and WML are the risk factors from the Carhart's model. ST Bond, INT Bond, LT Bond, HY Bond and IG Bond are the additional factors of the 9F model presented earlier. The remaining variables are previously defined. Time and investment-style dummies are included but not reported; t-statistics are reported in parentheses, and the constant term has been omitted. The unconditional probability is reported and described as the baseline predicted probability. Standard errors are clustered at the fund level. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Equity Loadings			Debt Loadings		
	Coef/t	Mfx	Std	Coef/t	Mfx	Std
Ivy league	0.942**	0.016**	0.417	0.966**	0.016**	0.417
	(1.980)			(2.033)		
MBA	-0.094	-0.002	0.495	-0.090	-0.002	0.495
	(-0.196)			(-0.188)		
PHD	1.752***	0.030***	0.164	1.840***	0.031***	0.164
	(2.737)			(2.942)		
Company Background	-0.102	-0.002	1.313	-0.105	-0.002	1.313
	(-0.572)			(-0.580)		
Business Studies	0.682	0.012	0.399	0.689	0.012	0.399
	(1.250)			(1.286)		
Quantitative Studies	1.329*	0.022*	0.169	1.379*	0.023*	0.169
	(1.688)			(1.807)		
Experience	-0.005	-0.000	8.660	-0.003	-0.000	8.660
	(-0.255)			(-0.177)		
MKT	0.779*	0.013*	0.518			
	(1.944)					
SMB	-0.346	-0.006	0.291			
	(-0.714)					
HML	0.057	0.001	0.371			
	(0.169)					
WML	-0.424	-0.007	0.216			
	(-0.817)					
ST Bond				-0.001	-0.000	42.657
				(-0.395)		
INT Bond				0.005	0.000	7.515
				(0.249)		
LT Bond				-0.158**	-0.003**	1.690
				(-2.354)		
HY Bond				0.197	0.003	0.983
				(1.407)		
IG Bond				0.011	0.000	5.414
				(0.538)		

(Continued)

TABLE 11 (cont'd)

Size (log TNA)	0.205**	0.003**	2.025	0.232**	0.004**	2.025
	(2.055)			(2.238)		
Age	0.016	0.000	8.572	0.014	0.000	8.572
	(1.088)			(0.922)		
Expenses	0.468	0.008	0.597	0.581	0.010	0.597
	(1.132)			(1.415)		
12b-1 fee	0.659	0.011	0.316	0.642	0.011	0.316
	(1.042)			(1.024)		
Front Load	-0.154	-0.003	0.505	-0.132	-0.002	0.505
	(-0.471)			(-0.417)		
Back Load	0.184	0.003	1.432	0.175	0.003	1.432
	(1.303)			(1.236)		
Turnover	-0.477*	-0.008*	2.232	-0.477*	-0.008*	2.232
	(-1.796)			(-1.907)		
Flows	0.061***	0.001***	0.688	0.062***	0.001***	0.688
	(3.692)			(3.938)		
Company Funds	-0.048***	-0.001***	50.790	-0.047***	-0.001***	50.790
	(-3.164)			(-3.136)		
Company Size	0.333**	0.006**	2.329	0.329**	0.006**	2.329
	(2.103)			(2.037)		
Observations	34542			34542		
Pseudo R2	0.209			0.206		
Baseline predicted probability	0.051			0.051		

5. Endogeneity Issues

As with any empirical study, an important concern in the interpretation of our results is the fact of being under some endogeneity issues. In the following sections, we take a number of steps to address this concern.

5.1.Propensity Matching Scores.

Our first endogeneity concern arises from the idea that SRI might perform better when they are managed by individual managers due to a selection criterion from the management companies, which allocate their best managers into a single structure of management of SRI funds, while set the worse managers to manage conventional funds within a team organization. Thus, SRI funds managed by individuals outperform not because of the effect

of the manager's most resources optimization per se, but for the way the managers self-select themselves to be allocated. Therefore, in this section we employ a propensity score matching procedure using Nearest Neighbor of Rosenbaum and Rubin (1983), and the Stratified Sampling of Hunt and Tyrrell (2001) to identify a control sample of funds that that exhibit no observable differences in characteristics except for the main variable of interest.

In Table 12, we compare the fund performance (the alpha from the 9-factors model previously defined) between different groups under a propensity score matching approach. To implement this methodology, we first calculate the probability (e.g., the propensity score) that a fund with given characteristics is managed by a single manager. The propensity score is calculated using the portfolio manager characteristics that we included in the specification model [3]. More specifically, this probability is estimated as a function of fund size, fund age, expenses turnover, fund flows, number of funds per family and family size. To ensure that the funds in the control sample are sufficiently similar to the funds on treatment group, we require that the maximum difference between the propensity score of these funds and that of its matching peer does not exceed 0.1% in absolute value. We can observe that main results remain unchanged and we can certainly confirm that individual management structures are better when managing SRI funds.

5.2.Heckmann two-Step Selection Bias.

By construction, to examine the effect on individual vs team management organization on SRI funds, we need to assume that the fund family is free to offer SRI portfolios, however, in many cases the management company do not have a policy of offering these type of funds. Therefore, we will be under a selection bias problem in which, only a subsample of managers can be allocated to a SRI portfolio under a single mandates. To address this issue, we conduct the Heckman selection model, in which first we obtain the probability of being a SRI fund, and in the second stage, we estimate the effect of managing the portfolio individually on fund performance.

The Table 13 reports the regression results from the Heckman two-stage estimation. In the first-stage regression, we model the probability that a fund family is managing at least one SRI fund[58]:

$$Prob(SRI\ fund_{j,t} = 1) = \varphi(\beta_0 + \beta_1 Individual_{j,t-1} + \beta_2 Firm\ Policy_{j,t-1} + \beta 3 Idiosyncratic\ Risk j,t-1 + \beta 4 xj,t-12 + \varepsilon it \quad [7]$$

where φ(·) is the cdf (cumulative density function) of the standard normal distribution. The dependent variable $SRI\ fund_{j,t}$ is a dummy variable equals 1 if the fund has a Socially Responsible Investment policy. $Firm\ Policy_{j,t}$ is a dummy that takes the value 1 if the fund j belongs to a fund family that has at least one SRI fund and 0 otherwise. β_0 is a constant and $Individual_{i,t-1}$ is a dummy variable equals 1 if the funds is managed by a single manager. $Idiosyncratic\ Risk_{j,t-1}$ is measured by the standard deviation of the error from estimating the 9-F performance measure. X_{it-12} is a set of control variables previously used. We also include year and style dummies and the standard errors are clustered at the fund level. We show that the probability of being a manager that manages more than one fund depends positively on the ratio of funds per manager of their family.

In the second stage, we find that conditioned on the probability of being a SRI fund, those funds that are managed by an individual portfolio manager outperform their team-managed peer between 65.04 and 91.68 bps per year. Therefore, consistent with our last hypothesis, these results give more evidence that even though SRI funds are managed by managers with better investment profile, when controlling for superior managers self-selection, those managing SRI funds in individual structures are still better managed.

[58] The selection equation (first-stage regression) needs to include at least one variable that is clearly determining in the process of discriminating whether it belongs to the sample and at the same time not affect much the dependent variable. We have to assume that "Ratio Funds per Manager" is not affecting the promotion decision, as cannot think of any obvious economic stories for why this assumption would be false.

Table 12
Endogeneity Issues (I): Propensity Matching Scores

In this table, we identify different control samples on each row by employing two different propensity score matching procedures: Nearest Neighbor of Rosenbaum and Rubin (1983) and Stratified Sampling of Hunt and Tyrrell (2001). The propensity score is estimated using fund size, fund age, expenses turnover, fund flows, number of funds per family and family size. We require that the difference between the propensity score of the treatment and control groups does not exceed 0.1% in absolute value. We then compare the fund performance after fees (using net returns) between the two groups and report the value of the difference and the t-statistic using bootstrapped standard errors associated to that difference. Fund performance is defined as the alpha from Carhart and from the 9-factors model (Carhart's model augmented by 5 more factors). The first row compares SRI funds managed by individual portfolios and team managed ones. The second row presents the differences between SRI and Conventional funds managed by an individual manager. The last row shows the excess performance of SRI funds managed by individual portfolio managers over the rest of funds.

		Alpha Carhart		Alpha 9F	
		Nearest Neighbor	Stratified Sampling	Nearest Neighbor	Stratified Sampling
Individual Vs Team (SRI funds)	Difference	0.018	0.025	0.053	0.072
	t-stat	1.678	2.963	3.421	6.218
SRI Vs Conventional (Individual managed funds)	Difference	0.055	0.036	0.069	0.067
	t-stat	5.421	5.237	5.239	7.173
SRI (Individual managed) Vs any other funds	Difference	0.031	0.030	0.057	0.063
	t-stat	3.12	4.56	4.545	6.78

Table 13
Endogeneity Issues (II): Heckmann 2 Step Selection Bias

In this table, we show the estimates from Heckman's two-step procedure where the first stage regression model estimates the probability that a fund is under a social investment category and in the second stage, how being managed by individual portfolio manager affects the fund performance, conditioned on being a SRI fund. Firm policy is the proportion of Socially Responsible funds the family has over their total pool of funds offered. The remaining variables have been previously described. The sample contains all U.S. mutual funds from 1996 to 2011. Time dummies are included but not reported; t-statistics are reported in parentheses. Standard errors are clustered at the fund level. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

Second Step: Fund Performance		
	Alpha Carhart	Alpha 9F
Individual	0.0542***	0.0764***
	(6.11)	(6.11)
Control Variables	Yes	Yes
First Step: Probability of SRI funds		
Individual	0.0182*	0.0182*
	(1.86)	(1.86)
Size (log TNA)	0.0314***	0.0314***
	(10.80)	(10.80)
Age	0.0065***	0.0065***
	(13.15)	(13.15)
Expenses	0.0507***	0.0507***
	(5.53)	(5.53)
Turnover	-0.0337***	-0.0337***
	(-10.50)	(-10.50)
Flows	0.0130***	0.0130***
	(2.68)	(2.68)
Company Funds	0.0008***	0.0008***
	(5.62)	(5.62)
Company Size	-0.0601***	-0.0601***
	(-19.13)	(-19.13)
Firm Policy	4.9222***	4.9222***
	(178.42)	(178.42)
Idiosyncratic Risk	0.0953***	0.0953***
	(35.47)	(35.47)
Observations	439350	439350
Pseudo R2	0.3967	0.3877
Style Dummies	Yes	Yes
Time Dummies	Yes	Yes

6. Conclusions

The recent debate about the efficiency of team-management in the mutual fund industry has not considered the fact that some portfolios are under a restricted investment opportunity set from which a single manager approach could yield better managerial performance. This chapter is an empirical examination of whether SRI funds managed by individuals perform better than these funds managed by teams.

We examine whether individual management leads to better performance, relative to team management approach, when portfolio managers face a restricted opportunity set of investment. Socially responsible investment funds industry provides an ideal empirical setting in this context as these funds implements strict social criteria that exclude firms, economic sectors or even entire industries from their portfolios. Unlike conventional class of investments, SRI funds apply a set of investment screens to select stocks from an investment pool based on social, environmental or ethical (SEE) criteria. This implies a shorter universe from which a fund manager allocates their assets and greater coordination requirements. One of the advantages of using this specific investment industry is that, unlike sector funds, SRI selects the number of screens to apply to its investment portfolio. Thus, this allows us to compare not only restricted vs non-restricted portfolios but also within different levels of restrictions. Another important benefit is that despite the increasing trend of team management approach, there are many portfolios that are still managed by individual employees, hence we can evaluate differences between team and individual structures in general and also interact them between conventional and SRI funds.

We show that SRI funds are better managed under an individual management structure independently of the specific fund and family characteristics. This performance increases for SRI funds with highly levels of social screenings since individual management leads to sharpen information processing and decision-making. Our results are robust to different approaches, evidencing the organizational effectiveness when management structure is properly aligned to the operational scope.

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